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BRIEFLY TOLD.

MR. ALTEN S. MILLER GOES TO BALTIMORE, MD.—For something more than a fortnight rumor had it that an important change in the engineering staff of the Consolidated Gas Company, of New York, was about to occur, and rumor once more is confirmed. Mr. Alten S. Miller, President-elect of the American Gas Light Association, was the one with whom rumor had most to do, and the outcome of the guessing is that he has resigned his position as Superintendent of Construction to the Consolidated Gas Company, of New York, and has accepted the duties that belong to the place of General Manager of the Consolidated Gas Company, of Baltimore, Md., which position was virtually made for him. While the Baltimore concern would seem to have had a sufficient number of executive officers in the past, it is nevertheless true that Mr. Miller's place gives him entire control of its works and business policy, save, perhaps, in respect of taking on the care of the legislative ends concerned with "the business." Likely he will not regret the latter exemption. Mr. Miller has been Chief Engineer of the New Amsterdam Gas Company since its inception—the proprietors of which succeeded to the property and rights of the New York and East River Gas Company some years ago—(the manufacturing and storage plants of the latter are at Ravenswood, L. I., and the same were inspected by the American Gas Light Association during its convention here last month), and when the latter was absorbed by the Consolidated Gas Company, in the eventual rearranging of its engineering staff, Mr. Miller was named as Superintendent of Construction. He is a man of pronounced convictions, and his friends heartily wish him all success in his new field, which bristles with opportunities for perplexing work of all sorts. His successor on the staff of the Consolidated Gas Company here is Mr. Howard Bruce, who was Mr. Miller's chief assistant in the management of the New Amsterdam plant.

REGULATIONS OF THE UNIVERSAL EXPOSITION OF 1904, AT ST. LOUIS, MO.—At the meeting last May of the Western Gas Association it was ordered that a committee of three be appointed to consider and determine whether it would be advisable to have some fitting representation on account of the gas industry of America made at the Exposition. The committee has been appointed, and the subject is under consideration by its members. In connection with the matter, the following summary of the "Rules and Regulations" respecting the Exposition, for which we are indebted to Mr. Milan H. Hulbert, Chief of the Department of Manufactures, may not be without interest:

"From a careful perusal of the rules and regulations of the Universal Exposition of St. Louis in 1904 it is plain that they have been formed to facilitate the work of the exhibitor in every possible way, and not, as has too often been the case with expositions, to obstruct the efficiency of his installation.

"The following is a digest of these rules and regulations governing the exposition and affecting exhibits at the exposition. While made with special reference to the Department of Manufactures of the exposition it applies equally well to all departments.

"By a proclamation of the President of the United States the Exposition will open in April, 1904, and close not later than December 1st of the same year. All nations have been invited and are making arrange-

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ments to participate. The exposition, therefore, will be international in character—an exhibition of arts, industries, manufactures and products of the soil, mine, forest and sea. It will occupy about 1,000 acres of Forest Park, located about 30 minutes ride from the heart of the city of St. Louis, and the site will contain exhibition palaces ample and adequate to the great scope of the exposition.

"The admission price will be 50 cents, and the exposition will be open every day except Sunday. Exhibitors will have free admission to the grounds for the purpose of caring for their exhibits.

"No charge will be made for space allotted for exhibits, and in the discretion of the authorities power for operating machines and processes will be furnished gratuitously. The service of electricity, steam, compressed air, power from shafting, gas and water will be provided.

"Each application for space should contain a sketch of the proposed installation, drawn on a scale of one-quarter of an inch to the foot, and if possible the front elevation and general outline; and all decorations and designs must conform to the rules regulating the general schemes of color and perspectives. No construction will be allowed that obstructs the light or inconveniences other exhibitors, and no exhibit will be allowed of a dangerous or detrimental character, or that is incompatible, with the object or decorum of the exposition, nor any patent medicines or nostrums whose ingredients are concealed.

"Permits for space will not be transferable, and will be confined to such exhibits as are specified thereon. Exhibitors must prepay all transportation charges and provide at their own expense all showcases, shelving, counters, etc., required for their exhibit. All counter shafting, steam pulleys, belting, etc., as well as compressed air, water and sewerage connections must be paid for by the person applying for same. The installation of heavy articles requiring foundations may begin as soon as the progress on the construction of the buildings will permit. If no authorized person is at hand to take charge of exhibits, a reasonable time after their arrival, they will be stored at the expense of the exhibitor. Exhibits cannot be removed in whole or in part before the close of the exposition, but must be taken away by March 1st, 1905, or they will be considered as having been abandoned. The exposition will provide every possible protection for the exhibits, but it is not responsible for the property in any way whatsoever. It will also provide a storage warehouse for crates, boxes, barrels, etc., under a reasonable schedule of charges which the exhibitor has the option of making use of.

"The exposition will maintain an efficient police system and a corps of janitors. The latter will keep the roadways, paths and main aisles of the buildings clean, but exhibitors will be held responsible for the cleanliness of their exhibit spaces. They may also provide, if they desire, special watchmen at their own expense."

NOTES.—

GAS was turned into the mains of the newly constructed gas plant of the Citizens Light and Power Company, at Auburn, N. Y., early last week. The service of the consumers was started without any blundering. The plant was constructed by Capt. W. H. White, and is to compete with the plant formerly owned by Mr. Dunning and his associates. The gas rate has been cut to 50 cents per 1,000 cubic feet, and a brisk war is now on; more's the pity.

A very pretty wedding ceremony was that which marked the marriage of Miss Katherine Vincentine Byrne, daughter of Mr. and Mrs. Thomas E. Byrne, of 51 Montgomery Place, Brooklyn, N. Y., to Mr. John B. Baxter. The ceremony was had in the Church of St. Francis Xavier, Brooklyn, the evening of October 22d, the pastor, the Reverend David J. Hickey, officiating. A reception followed the ceremony, the scene thereof being the home of the parents of the bride. The bride's father, which explaining seems hardly necessary, at least to Eastern gas men, is Chief Engineer to the Kings County Gas and Illuminating Company, Brooklyn, N. Y.

A CORRESPONDENT in Baltimore, Md., writing to us under date of October 29th, says: "It will probably interest your readers, or at least those of them who have made a trip to Europe, that the Stettiner Chamotte Fabrik Actien Gesellschaft, of Stettin, Germany, has secured a contract in Plymouth, England, for the construction there of 8 benches of 9 inclined retorts, each 20 feet long, in competition against all English systems. The awarding of this contract was based entirely upon the results obtained from the German settings on the European Continent."

THE Red Oak Gas Company, to manufacture and supply gas in the settlement of Red Oak, Ia., has been incorporated.

[LIMITED ABSTRACT.]

PROCEEDINGS, THIRTIETH ANNUAL MEETING AMERICAN GAS LIGHT ASSOCIATION.

HELD IN THE GREEN ROOM, NEW YORK ATHLETIC CLUB, NEW YORK CITY, OCTOBER 15TH to 17TH, 1902.

FIRST DAY—WEDNESDAY, OCTOBER 15.—MORNING SESSION.

The Thirtieth Annual Meeting of the American Gas Light Association was called to order at 10 A.M., October 15th, by the President, Mr. Wm. R. Beal, of New York. Mr. A. E. Forstall, of Montclair, N. J., occupied the Secretary's desk, and the proceedings were reported by Mr. E. T. Davis.

ROLL CALL.

The following members were in attendance:

Honorary.

Barker, F. E., Boston, Mass.
Love, E. G., New York City.

Active.

Africa, W. G., Manchester, N. H.
Allen, W. H., Newark, N. J.
Anderson, W.C., Port Chester, N.Y.
Barret, A. H., Louisville, Ky.
Barrett, W. E., Ardmore, Pa.
Battin, H. S., Philadelphia, Pa.
Beal, T. R., Poughkeepsie, N. Y.
Beal, W. R., N. Y. City.
Bell, E. W., St. Louis, Mo.
Benner, H. W., Long Branch, N. J.
Bissell, W., Jersey City, N. J.
Blodget, C. W., N. Y. City.
Bradley, F. L., N. Y. City.
Bradley, W. H., N. Y. City.
Brown, E. C., N. Y. City.
Brown, R. B., Milwaukee, Wis.
Brundrett, E. L., Philadelphia, Pa.
Buck, D., Jr., Phœnixville, Pa.
Buck, H. M., Waukesha, Wis.
Buckman, J., Philadelphia, Pa.
Burke, J. E., Princeton, N. J.
Butterworth, C. W., St. Albans, Vt.
Butterworth, I., Denver, Col.
Byrne, T. E., Brooklyn, N. Y.
Callanan, J. M., Chester, Pa.
Cathels, E., Hamilton, Ont., Can.
Childs, A. E, Boston, Mass.
Clabaugh, G. W., Omaha, Neb.
Clark, W., Philadelphia, Pa.
Clary, E. D., Burlington, Ia.
Coates, J. R., Ottawa, Ont., Can.
Coggshall, H. F., Fitchburg, Mass.
Collins, D. J., Philadelphia, Pa.
Collins, H. P., Little Falls, N. Y.
Cooper, W. H., Amsterdam, N. Y.
Corbett, C. H., Brooklyn, N. Y.
Cosgrove, W. L., Atlanta, Ga.
Cowdery, E. G., Milwaukee, Wis.
Crafts, H. C., Northampton, Mass.
Cressler, A. D., Fort Wayne, Ind.
Curtis, S. P., Philadelphia, Pa.
Daly, D. R., Jersey City, N. J.
Daniels, J. M., Columbia, S. C.
Davies, H. W., Keyport, N. J.
Dell, J., St. Louis, Mo.
Diall, M. N., Terre Haute, Ind.
Dickey, C. H., Baltimore, Md.
Dixon, A. J., N. Y. City.
Doherty, H. L., N. Y. City.
Dole, C. E., Bangor, Me.
Donahue, E. J., Jersey City, N. J.
Doty, P., Detroit, Mich.
Douthirt, W. F., N. Y. City.
Dunbar, C. H., Elgin, Ills.
Dunn, F. S., Albany, N. Y.
Dusenberry, J. P., Newark, N. J.
Dutton, L. R., Wyncote, Pa.
Dutton, R. H., Hanover, Pa.
Eaton, W. M., Jackson, Mich.
Edwards, G. B., N. Y. City.
Egner, F., Morristown, N. J.
Evans, C. H., Chicago, Ills.
Eysenbach, E. E., Columbus, O.
Faben, C. R., Jr., Toledo, O.
Ferrier, J., Columbus, Ga.
Flemming, D. D., Jersey City, N.J.
Floyd, F. W., N. Y. City.
Forbes, C., London, Ont., Can.
Forbes, J., Chattanooga, Tenn.
Forstall, A. E., N. Y. City.
Ganser, H. H., Norristown, Pa.
Gates, F. W., Hamilton, Ont., Can.
George, T. L., Philadelphia, Pa.
Gerould, C. L., Galesburg, Ills.
Gibbons, P. H., Philadelphia, Pa.
Glass, S. J., Milwaukee, Wis.
Golden, J. W., Savannah, Ga.
Gould, J. A., Boston, Mass.
Green, J., St. Louis, Mo.
Graf, C. H., Hackensack, N. J.
Graham, M. M., N. Y. City.
Guldlin, O. N., Fort Wayne, Ind.
Gwynn, J. W., Bucyrus, O.
Hadden, J. M., Poughkeepsie, N.Y.
Haines, J., Philadelphia, Pa.
Hall, A. H., N. Y. City.
Hamilton, D., N. Y. City.
Harper, G. H., Altoona, Pa.
Harris, J. A., Philadelphia, Pa.
Hartpence, C. C., N. Y. City.
Helme, W. E., Philadelphia, Pa.
Herron, J. T., Buffalo, N. Y.
Holzer, E. G., Easton, Pa.
Horton, T. O., Stapleton, S. I., N. Y.
Hough, D. L., N. Y. City.
Humphreys, A. C., N. Y. City.
Humphreys, C. J. R., Lawrence, Mass.
Humphreys, J.J., Jr., Coney Island, Brooklyn, N. Y.
Isbell, C. W., N. Y. City.
Jourdan, J. H., Brooklyn, N. Y.
Kellogg, L. L., Sioux City, Ia.
Klumpp, J. B., Philadelphia, Pa.
Knapp, I. N., Wayne, Pa.
Lathrop, A. P., St. Paul, Minn.
Lawrence, W. F., Long Island City, N. Y.
Leach, H. B., Taunton, Mass.
Learned, C. A., Meriden, Conn.
Learned, W. A., Newton, Mass.
Leonard, C. F., Fall River, Mass.
Lillie, L., Philadelphia, Pa.
Linton, S. E., Jr., Savannah, Ga.
Littlehales, T., Syracuse, N. Y.
McDonald, W. Albany, N. Y.
McIlhenny, J., Philadelphia, Pa.
McIlhenny, J. D., Philadelphia, Pa.
McKenzie, W. H., Sioux Falls, S.D.
Mann, H. E., Cleveland, O.
Mansur, J. H., Royersford, Pa.
Max, W. J., Middletown, N. Y.
Mayers, J. A., N. Y. City.
Miller, A. S., N. Y. City.
Miller, C., Chicago, Ills.
Miller, I. A., Colorado Springs, Col.
Milsted, W. N., N. Y. City.
Mitchell, K. M., St. Joseph, Mo.
Moloney, M., Philadelphia, Pa.
Morris, W. C., Long Island City, N. Y.
Morton, F. N., Hoboken, N. J.
Moses, F. D., Trenton, N. J.
Nettleton, C. H., Derby, Conn.
Norris, R., Philadelphia, Pa.
Nute, J. E., Fall River, Mass.
Nutting, C. H., Chicopee, Mass.
Old, G., St. Augustine, Fla.
Page, C. H., Jr., Philadelphia, Pa.
Perkins, J. D., N. Y. City.
Pinkney, E. A., Steelton, Pa.
Pollitt, L. I., Pine Bluff, Ark.

Poor, F. B., Stamford, Conn.
Pratt, E. G., Des Moines, Ia.
Prendergast, D. J., New York City.
Prichard, C. F., Lynn, Mass.
Purcell, T. V., Chicago, Ills.
Quinn, A. K., Newport, R. I.
Ramsdell, G. G., N. Y. City.
Reilly, J. W., Wilmington, N. C.
Rice, H. L., Norfolk, Va.
Ringwood, T., Ilion, N. Y.
Riselay, W. S., Buffalo, N. Y.
Roberts, G. J., Philadelphia, Pa.
Robison, C. D., Auburn, N. Y.
Rogers, W. H., Paterson, N. J.
Roper, G. D., Rockford, Ills.
Rosenquest, E., Westchester, Bronx Borough, N. Y. City.
Rosenthal, A., Mount Vernon, N.Y.
Rowland, W. L., Philadelphia, Pa.
Russell, D. R., St. Louis, Mo.
Searle, R.M., Mount Vernon, N.Y.
Serrill, W. J., Philadelphia, Pa.
Shattuck, J. D., Chester, Pa.
Shelton, F. H., Philadelphia, Pa.
Sisson, F. N., Albany, N. Y.
Slade, R. E., Lockport, N. Y.
Slater, A.B., Jr., Fort Wayne, Ind.
Smart, F. R., Jr., York, Pa.
Spaulding, C. F., Waltham, Mass.
Spinning, W. V., Peru, Ind.
Spragle, L. D., Johnstown, Pa.
Stillwell, B. W., Yonkers, N. Y.
Stratton, F.A., Mount Vernon, N.Y.
Strecker, A. H., Newark, N. J.
Stroud, M. W., Philadelphia, Pa.
Tait, F. M., New London, Conn.
Taussig, J. H., Newark, N. J.
Taylor, J. D., Jr., Pueblo, Col.
Tobey, F., Jr., Kingston, N. Y.
Tull, L. P. F., N. Y. City.
Turner, T., Charleston, S. C.
Tuttle, W. B., Long Branch, N. J.
Wales, H. B., Grand Rapids, Mich.
Walker, E. M., Hyde Park, Mass.
Walker, S. R., Bay City, Mich.
Waring, G. H., Jr., Omaha, Neb.
Warmington, D. R., Cleveland, O.
Weber, O. B., N. Y. City.
Wells, L. W., Canton, O.
Westcott, J. T., London, S.W., Eng.
Wheeler, F. B., Binghamton, N.Y.
Whipple, H. S., Rockford, Ills.
Whitcomb, H. D., Jr., Newark, N.J.
White, W. H., N. Y. City.
Whittaker, A. D., Paterson, N. J.
Williams, E. H., Waterbury, Conn.
Williams, H. G., Mt. Vernon, N.Y.
Williams, W. L., Paterson, N. J.
Witherby, E. E., N. Y. City.
Woodward, R., Pittsfield, Mass.
Wortendyke, I. F., Janesville, Wis.
Young, J., Allegheny, Pa.
Young, P. S., Jersey City, N. J.
Young, P., Johnstown, Pa.
Young, R. R., Passaic, N. J.
Young, R., Pittsburg, Pa.
Young, R., Jr., Atlanta, Ga.
Zeek, C. F., Pensacola, Fla.

Associate.

Burchard, L. S., N. Y. City.
Carpenter, H. A., Pittsburg, Pa.
Coburn, C. M., Chelsea, Mass.
Crane, W. M., N. Y. City.
Dickel, W. L., Somerville, N. J.
Dods, J. C., St. Louis, Mo.
Eaton, A. B., Chicago, Ills.
Fiske, J. T., Port Chester, N. Y.
Graves, G. W., Rochester, N. Y.
Guenther, C. M., Philadelphia, Pa.
Harper, H. D., Chicago, Ills.
Lippincott, W. M., N. Y. City.
Luqueer, R. O., N. Y. City.
McDonald, D., Albany, N. Y.
McIlravy, W. N., N. Y. City.
Mills, W. A., Port Chester, N. Y.
Mueller, R., Decatur, Ills.
Norton, A. E., Boston, Mass.
Norton, H. A., Boston, Mass.
Persons, F. R., Toledo, O.
Potter, T. J., Hyde Park, Mass.
Roberts, C. V., Philadelphia, Pa.
Rodgers, E. H., Philadelphia, Pa.
Terhune, C. F., N. Y. City.
Webber, W., N. Y. City.
Welch, J. S., Philadelphia, Pa.
Wharton, H., Philadelphia, Pa.
Wickham, L., St. Louis, Mo.

On motion the reading of the minutes of the last annual meeting was dispensed with, and the record as printed in "The Proceedings," was approved. The Secretary read the following report from the Council in the instance of

ADDITIONS TO AND CHANGES IN MEMBERSHIP.

To the Members American Gas Light Association: Your Council submits the following report in connection with admissions to membership, and recommends for election the following:

Active.

Aldrich, F. B., Bethlehem, Pa.
Ammon, H. T., Wyandotte, Mich.
Barthold, W. H., Grand Rapids, Mich.
Baumgardner, T., Columbia, Pa.
Beck, G. W., Sunbury, Pa.
Bennett, C. W., Red Bank, N. J.
Blowers, F. W., Kalamazoo, Mich.
Bruce, H., Long Island City, N. Y.
Burgi, H., N. Y. City.
Campbell, J., Norwich, Conn.
Carter, R. A., N. Y. City.
Case, E. R., Jersey City, N. J.
Cashion, E. M., Glens Falls, N. Y.
Clark, J. A., Jr., East Orange, N.J.
Clements, W. B., Mt. Vernon, N. Y.
Cobb, B. C., Saginaw, Mich.
Coffin, C. F., Schenectady, N. Y.
Cole, G. M., Plattsburgh, N. Y.
Coles, J. M., Asbury Park, N. J.
Congdon, R. C., Lawrence, Mass.
Cummins, J. J., Syracuse, N. Y.
Daly, A. J., N. Y. City.
Danforth, G. C., Independence, Mo.
Davis, H. L., Tarrytown, N. Y.
Davis, J. J., Los Angeles, Cal.
Day, C. F., Springfield, Mass.
Dexter, M., Columbus, Ga.
Dickel, C. A., Philadelphia, Pa.
Duke, H. T., Philadelphia, Pa.
Duke, V. W., Philadelphia, Pa.
Duncan, G. F., Portland, Me.
Eisele, J. C., Newark, N. J.
Elliott, W. R., Philadelphia, Pa.
Ely, A., Rutherford, N. J.
Ely, A., Jr., Dover, N. J.
Eustace, J. H., Chicago, Ills.
Ferguson, B. B., Portsmouth, Va.
Fogg, O. H., Flushing, L. I., N. Y.
Gowen, S. C., New Brunswick, N.J.
Grace, J. W., Jersey City, N. J.
Graeff, H. W., Philadelphia, Pa.
Guffey, J. F., Pittsburg, Pa.
Guthrie, P. N., Hornellsville, N.Y.
Haase, E., Milwaukee, Wis.
Hays, J., Carlisle, Pa.
Hantzmon, H. M., Alexandria, Va.
Hardick, C. F., Philadelphia, Pa.
Howard, C. A., Aberdeen, S. Dak.
Hoyt, W. G., N. Y. City.
Huntress, F. A., Halifax, N. S.
Hyde, H. H., Racine, Wis.
Johnston, M. E., Jersey City, N. J.
Jordan, J. A., Cambridge, Md.
Lane, F. K., White Plains, N. Y.
Lindstedt, J., Manitowoc, Wis.
Lloyd, E. F., Detroit, Mich.
Lomax, C. S., Everett, Mass.
McDonald, D., Louisville, Ky.
M'Caffrey, G. F., Newburg, N. Y.
McGregor, W., Pawtucket, R. I.
Macmillan, R., Kansas City, Mo.
Marshall, W. H., Philadelphia, Pa.
Meginniss, E. B., Baltimore, Md.
Meginnis, N. T., Baltimore, Md.
Merritt, A. H., Niagara Falls, N.Y.
Merritt, A. H., Vineland, N. J.
Morehead, J. M., Chicago, Ills.
Morse, C. W., Haverhill, Mass.
Moulton, W. H., Portland, Me.
Parker, F. H., Burlington, Vt.
Perry, J. A., Yonkers, N. Y.
Pettes, W. H., Newark, N. J.
Polk, R. W., Rutland, Vt.
Pond, E. C., Petersburg, Va.
Quackenbush, C. H., Sag Harbor, L. I., N. Y.
Ramsey, W. H., Johnstown, Pa.
Reaves, R., Scranton, Pa.
Reitmeyer, A. F., Elizabeth, N. J.
Roohan, P. F., Saratoga Springs, N. Y.
Sawyer, F. H., Norfolk, Va.
Scranton, W., Scranton, Pa.
Serrell, L. W., N. Y. City.
Seymour, E. B., Corning, N. Y.
Sickels, A. C., Steelton, Pa.
Slade, F. C., Wilmington, N. C.
Springer, E. S., Leavenworth, Kas.
Stelling, C. A., Passaic, N. J.
Stiness, G. A., Pawtucket, R. I.
Stockton, R., Trenton, N. J.
Summers, G., Chicago, Ills.
Talbott, F., Danville, Va.
Thomas, C. G. M., Flushing, N. Y.
Tippey, C. W., Fulton, N. Y.
Titzel, C. E., Lancaster, Pa.
Tyler, W. G., Philadelphia, Pa.
Wainright, A.V., S. Norwalk, Conn.
Walton, A., Auburn, N. Y.
Welles, F. A., Jersey City, N. J.
Welsh, W. J., Stapleton, N. Y.
Woollen, A. L., Fishkill-on-Hudson, N. Y.
Young, A. W., Knoxville, Tenn.

Associate.

Bunnell, S. H., Lorain, O.
Compton, M. D., N. Y. City.
Cressler, A. M., Fort Wayne, Ind.
Cressler, G. H., Fort Wayne, Ind.
Genay, T. S., Philadelphia, Pa.
Gosnell, W. D., Baltimore, Md.
Gregg, F. M., Cleveland, O.
Kahn, L., Hamilton, O.
Kenah, R.L., Jr., New Brighton, Pa.
McDonald, A., Erie, Pa.
Manring, J. L., Middlesborough, Ky.
Miller, R. S., Chicago, Ills.
Piser, T. H., Boston, Mass.
Plantinga, P., Fort Wayne, Ind.
Schutt, H. L., Buffalo, N. Y.
Steinwedell, W. E., Ft. Wayne, Ind.
Vincent, G. I., Philadelphia, Pa.
Walter, E. P., Philadelphia, Pa.
Wray, E. W., Chicago, Ills.

ELECTION OF NEW MEMBERS.

On motion of Mr. Williams, the Secretary was directed to cast the ballot of the Association in favor of the election to membership of the gentlemen whose names were reported by the Council. Messrs. Strecker and Williams acted as tellers. The Secretary having reported in accordance with his instructions, and the applicants having been declared elected, the Association listened to the

ANNUAL REPORT OF THE COUNCIL

dealing with the general affairs of the Association, which was as follows:

NEW YORK, OCTOBER 15TH, 1902.

To the American Gas Light Association—Gentlemen: Your Council has the honor to make its annual report, as follows:

A separate report upon application for membership recommends the election of 120 applicants.

We recommend the election to honorary membership of Mr. Alpheus B. Slater, of Providence, R. I., believing that his services as a member and as an officer of the Association warrant us in conferring upon him that distinction.

The resignations of 12 active and 6 associate members have been received and accepted during the year.

The following list of papers and short topics has been approved to be read at this meeting:

"Some Notes on Cement Masonry," by I. N. Knapp, Philadelphia, Pa,

"The Care and Maintenance of Incandescent Gas Burners," by McDougald Dexter, Columbus, Ga.

"Gas Rates and a Franchise Tax," by George McLean, Dubuque, Ia.

"The Cleaning and Repairing of Gas Stoves," by Geo. S. Clarke, Kansas City, Mo.

"Why Milwaukee Did Not Build Inclines," by R. B. Brown, Milwaukee, Wis.

"A Test of a High Power Incandescent Gas Lamp," by W. Cullen Morris, Ravenswood, Long Island City, N. Y.

The Council has not been successful in making satisfactory arrangements for a lecture to be delivered before this meeting of the Association.

The Council recommends the adoption of the following amendments to the Constitution:

Proposed Amendments to Constitution in Regard to Membership.—Section 5, Article III., to be amended so as to read: "The members of this Association shall consist of four classes: Active, Honorary, Junior and Associate members."

A new section, 6a, to be inserted, as follows: "To be eligible as a Junior member a person must be over 20 years of age and be in the employ of a gas company or a consulting gas engineer, and be qualified, either by experience or education, to hold a responsible position under such employers."

Section 7, Article III., to be amended so as to read: "Associates shall be persons whose pursuits constitute branches of gas engineering, or

who are otherwise qualified to assist in promoting the objects of the Association."

Section 10, Article IV., to be amended so as to read: "The preceding rule shall apply equally to any person soliciting admission as a Junior member or as an Associate member. Application to be made upon a form, as shown in schedule B and BI respectively, which are appended to these rules."

The first sentence of Section 11, Article IV., to be amended so as to read: "It shall be competent for any Associate member to apply to the Secretary to be transferred from the class of Associate members to that of Junior members, or to that of Active members, and for any Junior member to apply to the Secretary to be transferred from the class of Junior members to that of Active members."

Section 12, Article IV., to be amended so as to read: "Applications for Active membership or for Junior membership, or for Associate membership, or for transfer from one class of membership to another, must be received by the Secretary at least 10 days prior to the meeting at which the application is acted upon."

A new section, 47a, to be added to Article IX., to read as follows: "47a. Every person elected as a Junior member shall pay an initiation fee of $5, which shall not include the dues for the current year. Any Junior member whose application for transfer to active membership shall be favorably acted upon will be required to pay an additional initiation fee of $5."

A new section, No. 49a, will also be added to Article IX., to read as follows: "Every Junior member shall pay annually in advance the sum of $3."

A new section, No. 57a, to be added to Article IX., to read as follows: "A Junior member will be entitled to all the privileges of the Association except voting and holding office."

Respectfully submitted,

ALFRED E. FORSTALL, Secretary. WM. R. BEAL, President.

On motion of Mr. Paul Doty the report was received and placed on file.

ELECTION OF MR. A. B. SLATER, SR., TO HONORARY MEMBERSHIP.

On motion of Mr. Paul Doty, the recommendation of the Council that Mr. Alpheus B. Slater, of Providence, R. I., be elected to honorary membership was then acted on, the ballot of the Association being cast by the Secretary. When the latter announced the result, it was received with applause.

The recommendation of the Council as to the adoption of the named amendments to the constitution was then unanimously agreed to.

REPORT OF THE TREASURER.

The Treasurer reported that the total receipts for the year ended September 30, 1902, were $4,765.76. The expenditures for the corresponding period were $3,967.08. The balance was $798.68. The report, which bore the certification of the Finance Committee, was, on motion of Mr. Paul Doty, received and filed.

REPORT OF THE SECRETARY.

The Secretary reported that the rolls of the Association for the year ended September 30, 1902, showed a total membership of 586, classified as follows: Honorary, 11; Active, 483; Associate, 92.

The following

REPORT OF THE TRUSTEES OF THE GAS EDUCATIONAL FUND

was read by the Secretary:

To the American Gas Light Association and Subscribers—Gentlemen: The Trustees appointed at the 26th annual meeting of the American Gas Light Association, held October 17, 1898, to administer the Educational Fund formed by your subscriptions, submit the following report as to the work done from October 1, 1901, to September 30, 1902:

The work of the correspondence class has been carried on throughout the year; the members of the second section having finished the 3 years of the course their connection with the class ceased on April 1st, 1902. The fifth section was started at work January 2d, with a membership of 35.

It is very gratifying to be able to report that several members of the class have become subscribers to the fund. In some cases the subscriptions have been made after their work had been completed, but in others the subscribers are still in the class, having become subscribers as soon as a change in position enabled them to do so.

Acting on a suggestion made by a member of the Council of the Association the names of all the students who have completed the full 3 years' course are given in the Secretary's report, and in future this report will contain each year the names of those who have finished the work during that year. It was thought that this official recognition of those who have had sufficient perseverance to finish up the work might encourage others to emulate their example. The same member of the Council has also prepared an index of the answers to the questions sent out to the class, by which the location in the "Proceedings" of the Association of any answer can be readily found, if it is desired to refer to such answer. This index is appended to this report and will be published with it.

The card index of gas periodicals, which has been one of the lines of work carried on by the Trustees, now covers all the principal articles published in the AMERICAN GAS LIGHT JOURNAL, *Progressive Age* and the *Journal of Gas Lighting*, since 1894. It is kept up to date, each number of these periodicals being gone over as it is received and the necessary cards made out and filed. The value of this index to any person wishing to read up on any subject connected with the gas industry will be readily appreciated.

The 5-year period, for which the original subscriptions were made, expires October 1st, 1903, and the last installment of those subscriptions is now payable. The usefulness of the work has been fully demonstrated by the number of students, their eagerness to take advantage of the opportunities afforded, and the appreciation that they express of the obligation that they are under to those who have furnished these opportunities. This appreciation is shown by the following quotation from a letter written to the Secretary by one of the members of the second section upon the completion of his work, this letter being the first one that came to hand out of some five or six received at about the same time:

"Please find inclosed a subscription to the Educational Fund. I desire at the same time to express to yourself and the gentlemen associated with you my sincere thanks for the means provided and the hearty assistance rendered in securing information through the medium of the fund. I have found the 3 years' course of very great value to me, not only on account of the knowledge acquired through the correct answers to the questions, but, in addition, to the great amount of information brought to my notice in the hunt for the answers. I trust your movement will meet with every success, and regret that I cannot at present afford a more liberal subscription."

This testimony should make the renewal of your subscriptions for another term of five years a matter of course.

No change has been made during the year in the rules governing the class. The special section, formed of college graduates, numbers 6 members, each of whom pays a tuition fee of $5 per year.

The number of members in each section at the beginning of the year, and the changes that have taken place during the year, are shown in detail on the Secretary's report, which is appended. The third section now contains 16 members, the fourth section, 24, and the fifth section, 43, making the total membership in the class 83. There is one special student who is receiving the questions and answers with the fourth section, and five special students who are receiving the questions and answers with the fifth section.

The other branches of the work as described in previous reports have also been kept up.

The Treasurer's report which is appended, shows the total amount of subscriptions to date, the available income and expenses for the year, a summary of the cash account, and a statement of the amount of the surplus fund and the securities in which it has been invested.

The surplus fund is made up of portions of subscriptions paid in in advance of the time when they are due, of unexpended balances and of interest received on investments. The proper portion of the advance subscriptions will, of course, be drawn out each year to meet expenses, but the unexpended balances and the interest will accumulate into a fund which will be available to assist in carrying on the work in case all the present subscriptions are not renewed when they expire.

Respectfully submitted,

Trustees Gas Educational Fund.

WALTON CLARK, Chairman. ALFRED E. FORSTALL, Secretary.

Statement of Eugene Vanderpool, Treasurer, Oct. 1, 1902.

Condition of Subscriptions.

		Per Year.
Total amount of subscriptions, Oct. 1, 1901.....	$20,999.20	$4,191.84
New subscriptions received since that date.....	130.00	26.00
Total to Oct. 1, 1902.....	$21,129 20	$4,217.84
Less amount discontinued.....	10.00	5.00
Total available to Oct. 1, 1902.....	$21,119.20	$4,212.84

Received from subscribers during year	$3,667.00	
Payments not applicable to year	87.00	
Total paid in by subscribers available for this year	$3,580.00	
Paid in previous to current year on account of 1902 subscriptions	632.84	
Total amount of subscriptions available for this year		$4,212.84
Dues received for membership in special class		30.00
Sale of one complete set of questions and answers for the second section		15.22
Total amount available for this year		$4,258.06

Statement of Income and Expense for Year.

Total amount available for year		$4,258.06
Expenses:		
Secretary's salary	$3,000.00	
Office rent	300.00	
Furniture (oak card cabinet)	35.00	
Printing, stationery, postage, etc	423.00	
Cuts for illustrating answers	47.77	
Total expenses, paid to Oct. 1, 1902	$3,805.87	
Add for expenses incurred, but unpaid:		
Printing, stationery, postage, etc	214,90	
Cuts for illustrating answers	25.51	$4,046.18
Balance		$211.88

Cash Account for Year.

Receipts:		
Received from subscribers during year	$3,667.00	
Interest for 1 year on $2,000 Binghamton gas works 1st mortgage 5 per cent. bonds	100.00	
Interest for 1 year on $1,500 Atchison, Topeka and Santa Fe Railroad general mortgage 4 per cent. bonds	60.00	
Sale of one complete set of questions and answers issued for the second section of the class	15.22	
Dues received for membership in special section of class	30.00	
Cash balance from last year	232.93	
Total amount paid in		$4,105.15
Expenditures:		
Total expenses paid		3,805.77
Balance		$299.38
Net balance in National Newark Banking Company, as per pass book	$294.38	
Cash on hand	5.00	
Total		$299.38

Surplus Fund and Investments.

Amounts paid in in advance		$818.72
Unexpended balance from 1898–1899		1,330.99
" " " 1899–1900		397.70
" " " 1900–1901		343.71
Interest paid on bonds to date		399 72
Total		$3,290.84
Already Invested:		
$2,000 Binghamton Gas Works 1st mortgage 5 per cent. bonds	$1,930.00	
$1,500 Atchison, Topeka and Sante Fe Railroad general mortgage 4 per cent. bonds	1,513.75	
Total		$3,443.75

NEW YORK, October 13, 1902.

This is to certify that we, the Finance Committee, have examined the books and vouchers of Eugene Vanderpool, Treasurer, and find that the same are correctly stated and balanced, and that there is due from him in cash the sum of $299.38. ALEX. C. HUMPHREYS,
Finance Committee.

Secretary's Report, Sept. 30, 1902.

	Second Sec.	Third Sec.	Fourth Sec.	Fifth Sec.	Special Class. 4th Sec.	Special Class. 5th Sec.	Total
Members enrolled, Oct. 1, 1901	22	30	36	..	2	..	90
Entered class, Jan. 1, 1902	..	1	2	35	..	..	38
Additions to class since Jan. 1, 1902	..	..	..	30	..	5	35
	22	31	38	65	2	5	163
Resigned since Oct. 1, 1901	1	4	2	..	1	..	..
Dropped for non-receipt of answers to date	6	11	12	22	..	..	..
Graduated. April 1, 1902	15	..	..	..	..	..	..
	22	15	14	22	1	..	74
Total enrollment this date	..	16	24	43	1	5	89

	Fourth Sec.	Sixth Sec.	Total.
Applications on file for admission to class, Jan. 1, 1903	1	3	4

Names of students who have completed the full 3 years' course:

Advanced Section.	*Second Section.*
Barr, R. J., Sr., Philadelphia, Pa.	Albietz, C., Philadelphia, Pa.
Benner, H. W., Bethlehem, Pa.	Bullock, B. F., Steelton, Pa.
Fish, R. E., Providence, R. I.	Dunne, P., Philadelphia, Pa.
Pedersen, B. S., Fort Wayne, Ind.	Fogg, O. H., Philadelphia, Pa.
Potter, H. W., Burlington, Ia.	Hunt, G. C., Worcester, Mass.
Powell, W. E , Logansport, Ind.	Johnston, E., St. Augustine, Fla.
Robison, C. D., Geneva, N. Y.	Malone, M. E., Madison, Wis.
Sherwood, M. S., Summit, N. J.	Mason, J. T., Milwaukee, Wis.
Stanton, E. S., Gloversville, N. Y.	Neth, J. A., Norwich, Conn.
Thompson, W. R., Philadelphia, Pa.	Old, G., St. Augustine, Fla.
Waring, G. H., Jr., Kansas City, Mo.	Olds, H. L., Bloomington, Ills.
	Palmer, H. C., N. Y. City.
Wills, J. V., Newark, N. J.	Vincent, G. I., Philadelphia, Pa.
Yerger, J. A., Philadelphia, Pa.	Wallace, R. A., Hamilton, Ont., Canada.
	White, H. E., New Haven, Conn.

The following members of the advanced section completed all the work with the exception of the last set of questions:

Barrows, G. S., Gloucester, N. J.	Young, P. S., Jersey City, N. J.
Gindele, A. H., Jersey City, N. J.	Young, R. R., Passaic, N. J.
Walsh, J. T., Providence, R. I.	

On motion, the report was accepted and ordered published in the "Proceedings," together with all the questions sent out during the year and the answers thereto, and an index to the answers so far received.

REPORT OF THE NOMINATING COMMITTEE.

The committee appointed to nominate officers for the ensuing year submitted the following names for election:

For President.—Alten S. Miller, New York.
For First Vice-President.—Rollin Norris, Philadelphia, Pa.
For Second Vice-President.—Edward G. Cowdery, Milwaukee, Wis.
For Third Vice-President.—C. F. Prichard, Lynn, Mass.
For Secretary and Treasurer.—Alfred E. Forstall, Montclair, N. J.
For Members of Council (terms expire in 1904).—David H. Geggie, Quebec, Can.; Robert M. Searle, Mt. Vernon, N. Y.; Frederick H. Shelton, Philadelphia, Pa.; W. P. Knowles, Richmond, Va.

ELECTION OF OFFICERS.

On motion, the report was adopted, and the Chairman of the Nominating Committee (Mr. A. C. Humphreys) was instructed to cast the ballot of the Association in favor of the election to office of the gentlemen named. Messrs. Williams and Nettleton acted as tellers. When the result was announced the President-elect, Mr. Alten S. Miller, acknowledged the honor bestowed upon him in suitable terms. He asked for the active co operation of the members, and pledged his best efforts for the promotion of the welfare of the Association.

Third Vice-President-elect (Mr. C. F. Prichard) also fittingly expressed his appreciation of the promotion that had been accorded him.

President-elect Miller assumed the chair, and President Beal read his

INAUGURAL ADDRESS.

[For the text of President Beal's address see JOURNAL, October 57th, p. 582.]

The address, which was received with applause, was referred to a committee consisting of Messrs. Paul Doty, Irvin Butterworth and F. B. Wheeler, for consideration and comment, with instructions to report their findings thereon at a later time.

[To be Continued.]

The Care and Maintenance of Incandescent Gas Burners.

[A paper prepared by MR. MCDOUGALD DEXTER, of Columbus, Ga., for the Thirtieth Meeting of the American Gas Light Association, Oct. 15 to 17, 1902.]

The incandescent gas burner has now been in general use some 8 or 9 years, and very probably the future of the gas lighting industry is to be by means of these burners. There has been little change in the present burners, either in the direction of mantles of stronger material or of burners that require any less expert and careful attention for their adjustment and maintenance. The tendency of improved burners seems rather to be in the direction of principles more complicated.

It may be stated as an axiom that the greater the complexity of an appliance the greater the need of expert supervision. On this ground alone gas companies should undertake the maintenance of incandescent gas burners. It is a part of their business in these days of competition to see that their product appears to the best advantage. It is the gas companies' product that is condemned when the burners are not up to the proper standard, or when they are a source of annoyance to the consumer.

Do not consumers prefer to be relieved of bother with the burners, even if they could be taught how to adjust them? Have you not furnished them with burner saws and seen how many neglect this simple attention?

Oil lamps owe their use partly to the fact that they require little equipment, namely, the lamps and oil can, and partly to their economy, because lights of low candle power are sufficient when they are portable and can be placed where required. They require some labor to keep them trimmed and filled; but this is simple and can be attended to by a servant. Furthermore, it is known at what intervals this attention is required.

The chief advantage of incandescent electric lighting is its convenience. Although it be expensive the consumer pays largely for being relieved of bother. The renewals are easily put on by anyone, and they require no regulating or adjusting. The maintenance of electric arc lights, on the contrary, requires expert attention and, of course, is looked after by the electric company's trimmers on their regular rounds. They supply the renewals, keep them adjusted and also keep the glassware neat and clean. The popularity of the arc lights is largely due to regular inspection and to the consumer being relieved of all care.

In dealing with the incandescent gas burner we offer a light of high candle power, a steady light and a very economical light, but one that, because of the delicacy of the mantle, requires careful attention and renewals at indefinite and unexpected intervals. It is this indefiniteness and unexpectedness that tend to annoy the consumer.

With gas consumers in general the influence of expectation should not be lost sight of. It is the unexpected bill that irritates. The bill the amount of which is foreknown is the bill that is paid with the least complaint. This is the cause of many preferring to pay a flat rate the year round rather than often a less amount in unexpected and indefinite amounts. While paying a bill for renewals a little larger than usual, they estimate the cost nearer this amount than the average of what they do pay.

We do not on these grounds advocate selling gas at contract or flat rates. In the absence of safeguards that electricity possesses, too great a margin has, in the case of gas, to be left for the unnecessary use which invariably occurs when the consumer considers that he pays to use it and wants to get his money's worth. But we do advocate a contract system for the furnishing of the attention and renewals required by the incandescent burners. Furnishing gas by meter tends to make the consumer careful, the amount used being dependent on his care. On the other hand, the amount of renewals is not exactly under his control. The fragility of mantles is now pretty well known, and as breakage is the source of more or less inconvenience the consumer is careful with them. The breakage that occurs is principally due to natural causes. With flat rates for renewals the consumer is insured against unexpected expense, and the gas company against unreasonable complaint.

We have had for several years here in Columbus, in connection with our contract maintenance, a system of inspection whereby visits are made once a week, the renewals supplied and the necessary adjustments made. If we wait for consumers to make complaint of breakage, most of them are made as darkness approaches and especially at lighting time. Very often the consumer is not reminded of his need until he has use again for the light, and at this time he wants it fixed promptly; for, if a store or office, it is a busy time. A great many single trips have to be made, and in the case of residences long trips. With this inspection system we have found that the congestion of complaints is very much reduced. Fewer men are required; they, therefore, become more expert. Most of the renewals are made by the inspectors when the store or office is not so busy or the light is not immediately required. They can, therefore, be adjusted with more care. The consumer is not required to make as many complaints, therefore he does not exaggerate the nuisance of breakage.

It might be argued that, as a certain amount of breakage occurs each day, an inspection once a week will only lessen the calls sent to the office for special trips by one-sixth. But the proverbial stitch in time should not be forgotten. It is a fact that a complaint is not made until the chimney or mantle is gone, or the lights badly in need of attention. The inspection system tends to keep the lights in good adjustment. The mantles are renewed when required, very often saving the chimney and another complaint.

With the inspection we include the supplying of clean chimneys in place of those badly soiled. We have found that there is a general prejudice among consumers against washing chimneys on account of breakage, and a general disinclination to handle such delicate appliances.

Almost all breakage of chimneys or other glassware is caused by a jet of flame through a hole in the mantle heating the glass unevenly, thus disannealing it. This is the cause of the damage, and washing only causes the breakage to occur a few days earlier, or it may not happen until it is put on another burner.

Gas arc lights were designed to compete with the electric arcs, and their success is largely due to the fact that they are usually inspected, cleaned and maintained by the gas companies at a fixed charge per month. The method of installing them, whether they be rented or sold, and the charges for rent and inspection and maintenance, are matters that are dependent in different localities upon the sharpness of competition.

In comparison with the electric arc, either plain or inclosed, the gas arcs are as ornamental, or even more so, considering the agreeable color of the light and its greater diffusive power. The light is steadier and there is not the disagreeable hum of the inclosed arc. They cost less to install and require less maintenance attention.

It has been found that the cost of renewals and attention is less for gas arcs than for separate burners. Fewer mantles are required, since one with a small break is still serviceable and has not to be renewed on account of danger to a chimney or small globe. The glassware not being highly heated is easily kept clean. A man in position to adjust one, inspects four or more burners without having to move his ladder, thus saving considerable time.

It is known that the most efficient burner is the one that has the best mixture of gas and air. Since we have a rather limited gas pressure it is necessary to have the maximum pressure possible at the Bunsen check. It would seem that smaller pipe than was necessary with flat flame burners would easily supply incandescent burners, since they consume only half the gas. With a number of plain burners lighted, the pressure at the tips is reduced and also the size of the flames. The flame is, however, of the same intensity and the reduction in the amount of light is hardly noticeable; but with incandescent gas lighting, while the flame is reduced by insufficient pressure, the size of the mantle remains the same and it is rendered only partly incandescent, consequently insufficiency of supply or pressure is the more noticeable.

It is a good idea, when making a renewal, to see that the flame is of the proper height and intensity; if not, the check should be cleaned of dust or other matter that would obstruct the amount or velocity of the gas. An obstructed gauze causes back pressure and insufficient air to be drawn in. Simply blowing through the gauze is sufficient to remove obstruction such as dust, but if corroded or burned it should be renewed. Dust, insects or, in barber shops, particles of hair are drawn in through the mixer. Part lodges on the gauze and part falls back on the check.

This obstruction considerably reduces the efficiency of the burner and has frequently to be removed, depending upon the amount the burner is used and the construction of the burner. Burners with meshes or sieves for the intimate mixture of gas and air are liable to lose rapidly in efficiency from obstructions of this nature.

It is important that outside lanterns be so constructed as to readily remove the products of combustion and not cause back pressure. There are few lanterns for clusters that do this.

A new cap with gauze is hardly necessary for every new mantle. Then to those who undertake maintenance, a loop mantle is preferable, apart from its cheapness, for the following reasons: It is easily removed for clearing the gauze of obstruction, and it can be burned off before placing over the cap, as a great part of the breakage of mantles during burning off, or the first night or so of use, is caused by the skirt of the mantle being imperfectly burned off and sticking to the cap. The expansion or contraaction of the mantle then causes a fracture.

Manufacturers have it in their power to greatly assist those who have adopted the maintenance system, and the why-nots that follow are more particularly addressed to them.

(1.) *Bye-Passes.*—The side tube bye-pass has the advantage over others in that the main gas supply is not reduced, and it is the most economical in gas consumption, since the mantle is in contact with the pilot flame and tends to keep it lighted. This spark of light enables one to find the burner on entering a dark room or hall. The objections to this form of bye-pass are that it is unhandy to place the gallery on, so that the side tube goes under the skirt of the mantle, and that a movement of the gallery round causes the side tube to alter its position and break the mantle. Why not bind the side tube in position by passing it through a lug similar to that for holding the mantle wire? The ground joint near the base of the side tube will enable the gallery to be placed on and off with ease.

(2.) The fact that a gallery can be lifted off is convenient, for the inspector has only to procure a step high enough to enable him to reach it. But for cleaning a check the Bunsen has to be screwed off and blown through, or else the inspector has to be high enough to see the check-holes to clear them with a pin. In this connection I would say that the check with a single orifice at the apex of a cone has the advantage that dust does not settle over this orifice, and the single orifice is not so easily obstructed as the smaller ones. Why not a burner that could be removed, check and all, as easily as the gallery is now, or as was the tip in the old plain burner? Such a burner could be removed, another substituted and the damaged burner brought to the office for thorough inspection and adjustment. It would be especially serviceable in exposed places where the handling of mantles is attended with risk.

(3.) Chimneys tend to become disannealed from the fact that they are unevenly heated, the impact of the air keeping the bottom of the chimneys comparatively cool. Why not a burner that would place the whole chimney within the hot zone? Where the chimney is frosted or etched there is little need for glass. With such an arrangement a shorter and, therefore, less expensive chimney could be used.

Although great developments may be expected in incandescent gas lighting, it is my belief that, even with our present appliances, we can hold our own in the lighting business, provided the burners are properly maintained. Whose business it is to see that they are so maintained does not admit of much question.

The Cleaning and Repairing of Gas Stoves.

[A paper prepared by MR. GEORGE S. CLARKE, of Kansas City, Mo., for the Thirtieth Annual Meeting of the American Gas Light Association, New York, October 15th to 17th, 1902.]

The cleaning with repairing of gas stoves has become, in the last few years, an interesting subject to gas men, and will become more so as the demand for gas for fuel purposes increases. Some 6 years ago the Company with which I am connected established a system of loaning gas ranges to its consumers, and has continued it, until now we have 16,000 ranges on our loan list. To keep these stoves in good working order, we soon found it necessary to establish a repair shop, which is now one of our regular departments, and to which every stove when removed from a dwelling is taken. You may imagine that with 16,000 ranges in service the task is no inconsiderable one, and the fact that many people use the stoves during the summer months and have them taken out during the winter, adds to the work of the department.

The work of cleaning and repairing a range may be divided roughly into 4 distinct operations: First, stripping or taking the stove to pieces; second, treating the loose parts to a bath of hot lye; third, the repairs proper; fourth, the erection and adjustment of the stove. When the range comes into the shop the maker's name, its size and its number are recorded in a book kept for this purpose. The Company's number is on a metal tag rivetted to the top casting. It is then turned over to the stripper who strips it of all loose parts. He takes off the top casting, removes the grates, burners, supply pipe, doors, pans, racks, and the oven linings, if they are worn out. He then gives the body of the stove a coat of gasoline to cut and loosen the dirt and grease, and while it is still wet brushes it thoroughly with a steel wire brush. He then takes a flat steel scraper and scrapes the top and sides clean, completing the work by going over the sheet iron parts with emery paper, number 1½ paper being used.

If the linings are sound, they are brushed and scraped and then given a coat of blacking; this improves their appearance and also tends to keep them from rusting. The inside of the burner box and the cast iron parts of the stove are then blackened and polished. One man will strip and clean a stove in 2 hours.

While this work is going on the loose parts of the stove, with the exception of the doors and supply pipe, have been taken to the kettle and placed in a solution of lye consisting of 20 pounds of 74 per cent. caustic soda dissolved in 40 gallons of water, and kept at a temperature of 160°. Two kettles are used for this work, one for lye and one for water. They are made of cast iron and are 4 feet long by 3 feet wide and 10 inches deep. They are heated with gas, drilled pipe burners similar to those used in the ovens of gas stoves being placed under them. It is an advantage to keep the lye hot, as it facilitates the work and aids in the removal of the dirt and grease. When the lye losses its slippery or soapy feeling, it should be thrown away and a new solution of the quantity made up, as it is no longer strong enough to be of any use. A solution of the quantity named will clean the parts of 100 stoves.

After the castings have remained in the lye bath until the dirt and grease are thoroughly loosened, which usually takes from 3 to 4 hours, they are fished out with an iron hook piece by piece, and the kettle man holds them with a pair of pincers, resting them on a drain board at the end of the kettle, and alternately dips them in the lye and scrubs them with a stiff fiber brush until they are clean. They are then rinsed off in the hot water to remove all effects of the lye and laid aside to dry. When dry the castings are wire brushed, and then blackened and polished. The stove doors are simply dipped in the lye solution, then wire brushed, scraped with a knife to reach the smaller recesses, and blackened and polished.

The supply pipes, air mixers and valves are cleaned and brightened by rubbing them with fine emery cloth. When the plating wears off they are painted with aluminum bronze, made by mixing the powder with amber-colored bronze liquor.

The burners are looked over carefully and the joints cemented if found to be leaking. We make a cement for this work composed of 10 parts of common putty, 1 part white lead, 1 part graphite, and enough lamp black to color it. We find this makes a lasting joint. One man will clean and polish the parts of 20 stoves a day.

The repairs consist of replacing wornout jackets, linings and door springs and relining stoves with asbestos board. Some of the castings have to be replaced, but this is a small part of the work. Most of the jackets wear out where the burners enter the lower oven, and as this only calls for the replacing of a part of the jacket, we find it an advantage to make nall ew jackets in 3 parts and not from 1 piece of iron as some of them are made. The same fault is to be found with the box oven lining—while only a part of it is worn out, the whole of it has to be thrown away. To avoid this waste we are making our own jackets and linings for stoves of this description. The tools used for getting out these parts are a 30-inch folder, 30-inch foot power shears and a punch fitted with different sized dies for punching the plates.

The renewal of the asbestos lining we confine to the upper oven, not considering it necessary to carry it below the point where the oven burners enter the lower oven. The linings are of $\frac{1}{32}$ asbestos paper and are made to adhere to the iron by the application of silicate of soda. In the bottom of the lower oven we place a sheet of $\frac{3}{16}$ asbestos board, covering it with a false bottom of sheet iron; this is done to avoid any chance of fire, as in a number of cases we have found the floors scorched under the stove. The average time of repairing a stove is 1 hour.

The cleaning and repairs being completed the stove is now ready to be assembled, that is, put together and adjusted. The top casting, the supply pipe and the burners are put in place, the valves are packed and the doors hung. The adjuster lights up the stove and goes over the burners with a pointed tool, or, in case of sawed burners, with a thin bladed knife, to see that every orifice is clear. The air mixers are regulated

and the oven tested to see that the heat is properly distributed. This is done by placing a piece of white paper on the oven rack, and as it changes from white to brown noting whether the color is uniform on both sides. It takes 1 hour to properly adjust a stove, and when this is done nothing remains but the painting and packing. All of the sheet iron work and that part of the supply pipe that is not plated are painted with turpentine asphaltum to which a little linseed oil has been added. The oil prevents the paint from giving it a blue cast when dry, and also gives a higher gloss to the paint. A tablespponful of oil to a gallon of paint is sufficient. The packing consists of placing the grates, shelves, pans and racks in the oven and wiring the door fast to prevent them from being taken out or misplaced. This completes the work in the repair shop and the stove goes to the storeroom to be kept until needed.

The Luther Gas Generator.

On the 23d ult., U. S. Letters Patent (No. 709,788) were granted to Mr. Charles J. Luther, of Red Bank, N. J., for an improved gas generator. According to Mr. Luther his invention relates particularly to that class of gas apparatus known as "Coal and water gas generators." Using the words of the specification:

The invention consists principally in the combination of devices for carbonizing bituminous coal, the decomposition of steam, and the generation of carburetted hydrogen gas, the coal gas passing off in one channel, the water gas and heavy carburetted gas being successively mixed, fixed, and passed through a separate channel, where it comes in contact with the coal gas and mixes therewith, the mixed gases being then carried to a separate vessel for use for illuminating or fuel purposes.

I will describe a gas machine embodying my invention and then point out the novel features in the appended claims. Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Fig. 1 is a plan view of a gas machine embodying my invention;

Fig. 1.

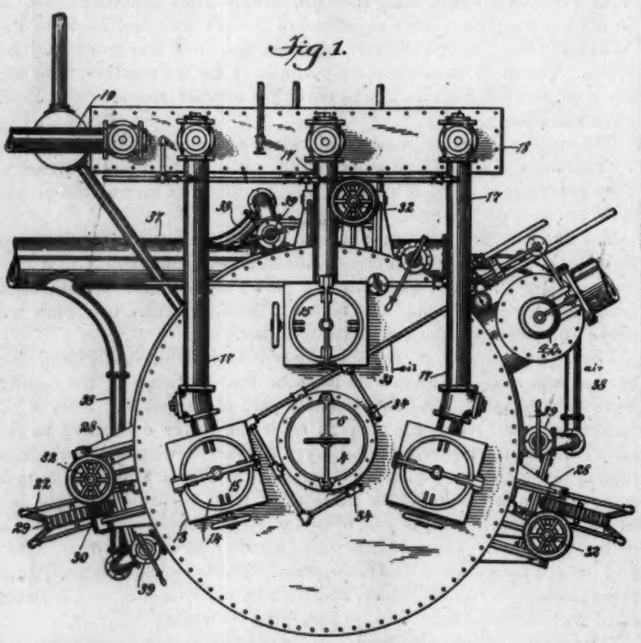
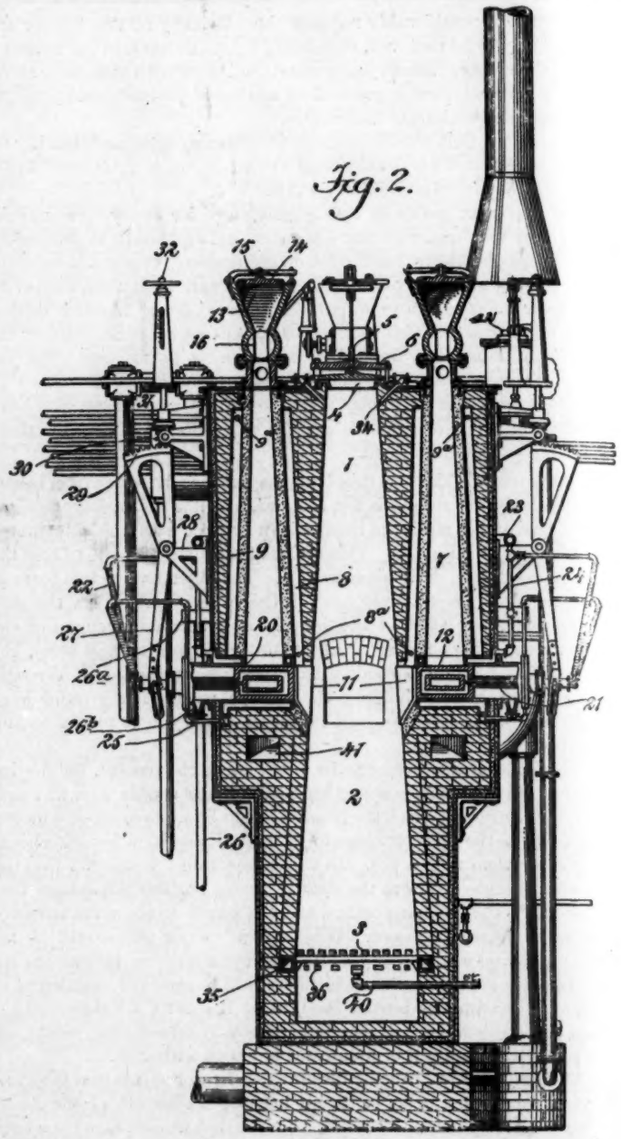


Fig. 2.



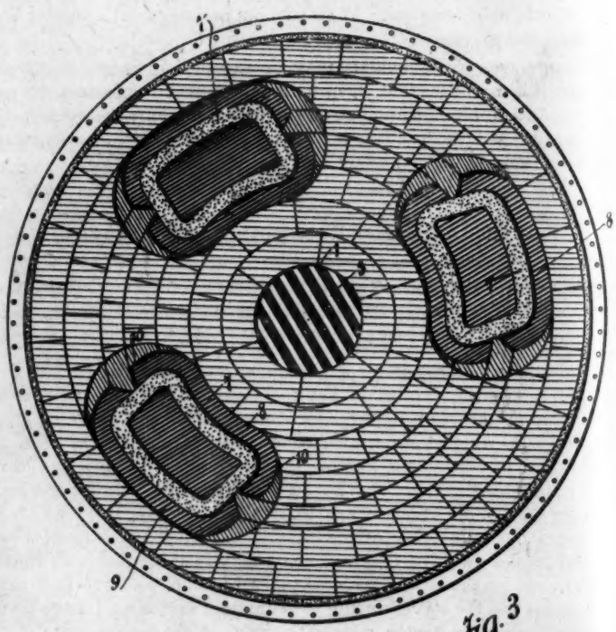


Fig. 3

Fig. 2 is a sectional elevation thereof; and Fig. 3 is a cross section through the vaporizer and retorts

Referring to the drawings, 1 designates the vaporizing chamber or cupola, below which is the generator 2, and in the lower portion of the generator is a grate 3. The vaporizing chamber is provided with a cover 4, that may be held tightly in place by any suitable means. I have here shown it as held in place by means of a screw-rod 5, engaging in a bar 6, held in slots at the opposite sides of the vaporizing chamber or cupola. Arranged around the vaporizing chamber is a series of retorts 7. These retorts are tapered, with the larger diameter at the lower end, to prevent the clogging of coke in the retorts. Extending partly around the retort and at the side adjacent the vaporiz-

ing chamber are air spaces 8, and extending partly around the opposite sides of the retort are air spaces 9. The air spaces 8 and 9 are separated for a greater portion of their length, but communicate one with the other at the top over bridge walls 10. The air spaces 8 communicate with the chamber 2, through ports 11, and these ports are normally closed by valves 12, which will be more fully described hereinafter.

On the top of each retort is a feed hopper 13, provided with a cover 14, held in gas tight connection with the hopper by means of a lever 15, pivoted to one side of the hopper and having its free end engaged with a hook or other suitable fastening device. Arranged below the hopper is a valve 16 and below the valve 16 is an outlet for gas, or a pipe 17, leading to a hydraulic main 18, from which a pipe 19, extends to a suitable storing device. The valves 12 normally form the bottom closures for the retorts. These valves are made hollow to receive a cooling liquid, such as water, and they are mounted to slide in valve casings 20, which are water jacketed, as plainly shown in Fig. 2, these jackets supporting the series of retorts. The hollow stems 21 of the valves 12 extend outward through the end walls of the valve casings and connect with flexible pipes 22, receiving water supply from a main pipe 23. Water is also supplied to the water jackets surrounding the valve casings through a pipe 24, leading from the main 23. The water jackets surrounding the valve casings communicate with the interior of the valve casings by means of pipes 25, and a discharge pipe 26 leads from an overflow tank 26^a, and to carry off dirt or other matter that might gather at the outer ends of the valves I provide hoppers 26^b. The valve stems are connected to the lower ends of levers 27, fulcrumed to brackets 28, and the upper end of each lever is provided with a segment rack 29, engaged by a pinion 30, which is rotated by a bevel gear 31 on the end of an actuating rod 32. An outlet pipe 33 communicates with the upper portion of the vaporizing chamber through branch pipes or tubes 34, four of these branch tubes being indicated in Fig. 1, and through these tubes oil may be admitted to the vaporizing chamber. An air flue 35 is arranged in the wall of the generator underneath the grate 3 and communicates with the ashpit through ports 36, and this flue 35 is in connection with the air supply pipe 37 by means of branch pipes 38, in which valves 39 are arranged. A steam pipe 40 also leads through the wall of the generator and has its nozzle underneath the center of the grate.

For making gas, the hoppers 13 are to be charged with coal and the covers tightly closed. Upon opening the valves 16, the coal will drop into the retorts, and as fast as the coal becomes carbonized by the heat and gases from the generator 2, which passes up through spaces 8, where it comes in contact with an air blast 8^a at the bottom of the spaces 8 which forms a combustion, then passes through spaces 9 at the top of which it comes in contact with another air blast 9^a which forms a secondary combustion. This heats the retorts and distils the coal into a carbonized state, then the gas passes off through the pipes 17 to the hydraulic main 18, and thence to the holder. The valves 12 are now to be drawn outward by means of their levers, permitting the coke to drop down into the valve chambers inward of the valves. After this the valves are to be moved inward, which will force the coke which is in an incandescent state through the ports 11 into the generator. In starting a fire in the generator, which is preliminary to the operation, the lid or cover 4 is to be opened and a suitable charge of coal passed in. After this preliminary heating, however, the generator is fed from the retorts. When first starting the fire in the generator, air is admitted through the flue 35, and this air passes through the grate where it comes in contact with the coke and then forms a combustion in the generator, then the heat and gas pass through the ports 11 and into the air spaces 8 where it comes in contact with an air blast at the bottom 8^a, and then passes up and over the bridgewalls and into the spaces 9, where it is met—that is at the top of the bridges—with another supply of air at 9^a, which forms a second combustion to heat the retorts as the gas passes down through the spaces 9. If anyone of the retorts should heat more rapidly than another, this can be diminished by operating its valve 12, passing the upper portion of said valve across the lower open end of the air space 8. After the heat reaches the desired degree the air controlling valves and the purge valve 42 are to be closed and steam is admitted through the pipe 40. The steam passes through a suitable superheating device, not shown, and then through the coke at incandescent heat in the generator. At this time oil is admitted through the pipe 33 and branches 34 into the vaporizing chamber, where it mingles with the gas at ports 11. Then this gas passes up through the spaces 8, over the bridgewalls, and then through the spaces 9, where the oil becomes decomposed and is made into a fixed gas, and this fixed gas passes through a flue 41 in the wall of the generator and through an escape-pipe to the holder, where the coal and water gases become mixed ready for consumption. The inventor then enumerates his claims (9 in number), but these need not be here repeated, in view of the specifications above given.

Distributed Lighting.[1]

[A paper read by MR. DOUGLASS BURNETT, B.S., at the last meeting of the Am. Inst. Elec. Engrs.]

The papers of Messrs. Bell,[1] Doane[2] and Ryan,[3] presented this year to the Institute, direct attention to the possibility of reducing the general considerations which they propound to a more scientific and exact basis than has yet appeared. Commercially speaking, the instances are few in which the raw material is the finished product, and the higher the civilization the greater the number of developing steps and the greater the efficiency of each.

The necessity of manipulating sources of light to practical ends has been realized for many centuries, and the early developments are illustrated in the Tissot paintings, which show a number of ancient lamps grouped on superposed trays.

Photometric studies have been concerned with sources of light, their production, comparison and standardization, their intensity, quality and characteristics; and with the instruments for measuring their candle power, both total and intrinsic, as well as with simple formulas for theoretical cases of light distribution.

Most experiments have been made in rooms or inclosed spaces from which practical conditions have been excluded as much as possible, the walls being plain and made non-reflecting by dead-black surfacing, and scientific refinements have so far been applied that even the atmosphere in which the standard flames have been burned has been replaced by one of pure oxygen.

I wish to direct thought to the necessity of determining, not the conditions existing at the prime source of light, but those existing at the illuminated surfaces with which we are constantly concerned in daily life.

No light may ever be used until it impinges upon something; for, unless interrupted, light will continue along a straight line indefinitely. Distributed sources of light and diffusing surfaces are always present in actual lighting. The percentage of time which one spends and of work which one does in direct sunlight in city life is very small; artificial lights should be and are usually so screened or arranged as to take advantage of the diffusion and minimize the glare in one way or another. These results are secured by applying more or less ornamental shades to naked flames, by frosting incandescent lamps or surrounding them with diffusing screens and directing shades, and by inclosing arc lamps and gas lamps of high intensity in translucent globes.

These processes are carried to an extreme in cases of "concealed lighting," where all the lamps are hidden from view behind solid cornices or translucent materials. In New York city there are several excellent instances of halls or rooms lighted entirely in this manner, using incandescent lamps.

The indications are that such methods may be applied to a greater extent than heretofore in the event of developments in vacuum tube or gas tube lighting. This type of lamp should lend itself particularly to diffused lighting effects, owing to the greater area of the source of light and its correspondingly decreased intrinsic brilliancy. The result would be a decrease in the spotting effect, which has been difficult to eliminate with incandescent lamps, owing to the brightness of the wall surface in the immediate neighborhood of the lamps. The optical efficiency is also high, being as much as 32 per cent. for Geissler tubes, compared with 5 per cent. to 10 per cent. for incandescent, and 15 to 25 per cent. for arc lamps.

It would be interesting to compare the intrinsic brilliancy of the light of such tubes with that of other lights; the figures are for an arc crater, 6,400-candle power per square centimeter,[5] for a Nernst glower about 100,[6] for an incandescent filament about 40, and for an Argand gas flame .3 candle power per square centimeter.[7] In connection with these figures it may be said that the arc lamp is much too dazzling for exposed use ordinarily, and even with the incandescent lamp the after image is quite prominent. It is seen that the development of lights of high intrinsic brilliancy renders increasingly important the study of the distribution and diffusion of their light.

The inverse square law for determining the amount of illumination on any surface is based on the conception that the light from an isolated source radiating into space decreases in proportion to the areas of con-

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centric spheres. In practice the amount of illumination is greater than would be determined by this law, but is less than that obtained from a non-divergent beam, such as that from a searchlight projector, in which case, were it not for the intervention of dust, fog or other obscuring particles, the illumination upon a standard reflecting surface would be the same at any point in the beam within an infinite distance.

The increase of the illumination upon a lighted surface due to diffusion from reflecting surfaces near the source of light, reaches a maximum represented by the expression $\frac{1^s}{1-f}$ where f represents the reflecting coefficient, and is the fraction showing the percentage of reflected to the incident light. If f equals 95 per cent., the multiplication would be 20 times. Some actual tests of this effect are needed, though reflection coefficients have been measured.[9] In consequence of this multiplying power, diffusing surfaces are, therefore, positive aids in distributing illumination.

The illumination apparent upon a surface is, according to Fechner's law, proportional to the logarithm of the actual lighting stimulus reflected from the surface.

The distribution of illumination along a surface with reflecting power of f per cent., from a lamp of intensity I candle power, located at a normal distance of h feet from the surface, throwing rays of light at angles Θ with the surface, the rays reaching points x feet distant from the foot of the normal, is determined by the formula

$$e = \frac{f I \sin \Theta}{h^2 + x^2}$$

"e" is to be measured in luxes or candle feet. In this connection question may be raised as to the desirability of calling the lighting effect of one lux on a unit surface otherwise called a lumen, one "ray" or one "beam" of light, just as in connection with the magnetic field we use the term "line of force."

It is, therefore, possible in some measure to calculate the distribution of lighting along an illuminated surface, though the problem becomes further complicated when a second reflecting surface is introduced, and it may be at present considered impracticable to determine with any fair degree of accuracy the actual illumination in a room.

It seems, however, quite possible actually to measure this lighting effect. In several instances such curves of illumination have been plotted,[10] but are usually based upon the assumption that there is no reflection or diffusion. In others, the mistake has been made of plotting the candle power of the light incident upon the surface, with the result of exaggerating the apparent lighting effect.

A fundemental law in this connection is that illuminations from independent sources may be arithmetically added to determine resultant illumination. An error, which I think has always been made, is in connection with the plotting of the space intensity curves of incandescent, arc, Nernst and other lamps. The impression they convey would much more nearly accord with what actually occurs if the curves showed, not the intensity of light in the various directions but the lines along which the lighting is equal at any point. Such curves may be called "isophotals," and while they are of the same general shape as intensity curves, their dimensions are as the square root of the radii. A theoretical set of such curves has been published by Weber.[11]

The tendency of inclosing an arc, for instance, either in the interior gas globe or more particularly in the outer diffusing globe, is to make such an isophotal curve approach more nearly a circle, which effect is further enhanced by the diffusion from a neighboring ceiling, thus tending towards the desired result of a flat curve, indicating uniform illumination.[12]

Arc lamps for the lighting of country roads should be such as throw their lighting downward; whereas, in the lighting of city streets lined with buildings, lamps should be used as will throw such an amount of light on the walls for diffusion purposes as will not be objectionable to the occupants.

A number of photometers for determining the intensity of sources of light have been devised, while few instruments, notably those of Weber[13] and of Houston and Kennelly[14] for the measurement of illumination on a surface, have been described; but in each of these the lighting was not measured directly, being adjusted by means of screens, or by means of the weakening of visual power, and then compared with a standard amount of illumination. The nearest approach to attempt such a measurement has been made, I believe, by Hutchinson,[15] in connection with the lighting of the Congressional Library at Washington; but in this case a simple photometer with a Bunsen grease spot disk was used, one side being exposed to the illumination of the room, the other to an adjustable standard of light—in this case a 16-candle power lamp; but in that case the candle power was measured and the illumination estimated from the known distance of the group of lights, no allowance being made for diffusion, and all measurements were made in a single position.

The Bunsen, the Lummer-Brodhun, and other standard photometers operate with varying and indeterminate amounts of lighting on the surfaces to be compared; and anyone of them is in essence a luminometer rather than a photometer, since the candle power is deduced by the application of the mathematical formula instead of measured or compared directly.

The author has devised an instrument arranged so as to expose a standard white surface to the ordinary lighting of a room, the amount of which is not varied. The position of a small incandescent lamp in reference to a similar and adjoining surface is, however, adjusted in order to secure within commercial limits an equal illumination, the position of this standard lamp being indicated on a graduated scale in terms, not of distance but directly in terms of the number of luxes. Other observers[16] have stated that the use of small incandescent lamps is quite permissible for such purposes for several hundred consecutive observations. The only precaution necessary in the use of such an instrument would be to shield the eyes from light other than that reflected from the two standard surfaces, and to shield each respectively from the other source of light.

It may be of interest at some future date to plot the space candle power curves from a standard open arc without inclosing globe, the space candle power curves of an inclosed lamp of the same watt consumption with the diffusing globe used in practice, the isophotals from the latter lamp, the theoretical illumination from the open arc along a horizontal surface without diffusion, and the actual illumination curves from the lamp with the inclosing and diffusing globes in a room under normal operating conditions.

In addition to the case cited there have been but few instances where the amount of illumination on a surface has been measured or calculated, notable among which may be mentioned a test of the lighting of the streets of Paris.[17]

Our methods of expressing illumination have been in terms of the number of standard lamps such as those of 16-candle power 50 watts per 100 or 1,000 square feet of surface. Bell[18] has expressed an opinion that 5-candle power per square inch is a maximum for interior lighting. Cohn[19] has given 10-meter candles as the hygienic minimum and 50-meter candles as the value of daylight; and Wybauw[20] has given 15 to 25-meter candles as necessary to fluent reading, or one meter candle for street lighting. Possibly practical requirements may hereafter be more clearly specified by the assistance of some such instrument as has been suggested in this paper.

The Difficulties that Students of Electrical Engineering Meet With.

[By "A STUDENT," in *Elec. Review*, London.]

I am a student, I think as a student, write as a student, and I write this little article on behalf of my fellow students, in the hope that in some small way I may give voice to the various difficulties that all students of our profession, with whom I have come into contact, seem to meet with. Of course, all students do not meet with the same difficulties; problems that are insurmountable to some are perfectly simple to others, but still there are some things that nearly all of us experience difficulty with, and if only we stated our difficulties a bit more clearly,

1. Methods of Illumination; Am. Inst. Elec. Engrs., Jan. 3, 1902.
2. Some Common Faults in Exterior Illumination; Am. Inst. Elec. Engrs., Jan. 3, 1902.
3. Street Illumination and Units of Light; Am. Inst. Elec. Engrs., Jan. 3, 1902.
4. Palaz, Industrial Photometry; p. 264.
5. Ibid; p. 318.
6. The Standard 50-c. p. 220-volt glower is 25 mm long and 0.63 mm. diameter. Wurtz; Am. Inst. Elec. Engrs., Aug. 23, 1901.
7. Palaz, Industrial Photometry; p. 258.
8. Palaz, p 298.
9. Palaz, p. 318; W. E. Sumpner, Phil. Mag., Feb., 1893.
10. Palaz, p. 285.
Bell, Electrical World and Engineer, Vol. XXXVII., No. 14, p. 553.
Utzinger, Zeit f. Beleucht., March 20, 1899.
11. Weber, Kurven zur Berechnung der von Kunstlichen Lichtquellen indizirten Helligkeit, E. T. Z., 1885.
12. Utzinger, Z. f. B., March 20, 1899.
13. Heinrich, Am. Inst. Elec. Engrs., May 15, 1894.
14. Houston & Kennelly, Nat'l Elec. Lt. Assn., Feb. 20, 1895.
15. Hutchinson, Elec. Engr., N. Y., Vol. XXIV., No. 496, p. 425.
16. Heinrich, Am. Inst. Elec. Engrs., May 15, 1894.
17. Palaz, Industrial Photometry, p. 262.
18. Bell, Methods of Illumination, A. I. E. E., Jan. 3, 1902.
19. Utzinger, Z. f. B., March 20, 1899.
20. Mesure et repartition de l'eclairement; "Bull, de la Soc. Belge d'Electrique," 1885.

and spoke out more loudly, perhaps more trouble would be taken to guide us on the somewhat thorny path we have chosen.

From the mere fact that we are students, however, we are almost debarred from the use of the columns of professional papers; we are considered nobodies, or, at least, only somebodies who are to do what we are told, to learn just what professors and mathematicians feel in the mood to teach us, and to believe that it is good to study this or that just because we are told it is good.

If this little article, however, meet the eye of some learned professor steeped in *dx* and *dy*, or that of some eminent consulting engineer who has forgotten that he ever was a student himself, and they should lift the finger of scorn, I would say to them, Beware! remember that the student of to-day is the engineer of to-morrow; remember that our engineering reputation is being attacked on all sides, and that, especially in matters electrical, other nations are actually worsting us. Remember that the seeds of instruction which you sow to-day will bear fruit to-morrow, and accordingly as you train us to-day, so shall our great engineering industry thrive or fail to-morrow.

The training of electrical engineers has become of vast importance, and the subject has been under discussion, and much has been written by learned writers, but why should not the student have his little say, the more so seeing that he is the person directly interested.

I would preface what I am going to say by the statement that I am only writing for a certain class of student, *i. e.*, the average hard working industrial student, who is trying his very best to get on with the brains at his disposal.

There are two other classes of students, firstly, the exceptionally clever and brilliant student, to whom all things are easy, and come as second nature, and those of us who belong to this class are, alas, all too few; and, secondly, there is the well-known, and I am afraid, rather numerous class of ne'er-do-wells, who are students only in name. To these two classes of students it matters very little what system of training they undergo. The one will be a success and the other a failure, under almost any system.

Now to work. I will try and be as brief as I can.

First, the student of electrical engineering has a somewhat undefined idea that he is being taught much that will never be of any use to him in the future. This does not appear to be the case in most other professions. For example, a medical student knows that when he learns how to perform an operation, or how to treat some special disease, that he is learning the work that he will actually have to perform himself later on. Take now the case of the engineer student. He knows well enough when he is learning how to draw a sine curve, or (in his practical work) how to clean wires and joint a cable, that in all probability he will never have to do this again in his life.

At the outset of his training, then, the student is apt to be suspicious of what he is taught, and day after day he becomes more inclined to pick and choose for himself what special thing he will study, and what he will entirely leave alone. One student will have a leaning towards the practical part of his work, and tell you that theory is all "rot," and "no good," and only fit for Prof. "Dryasdust." Another student will not like to soil his hands, and would scorn the knowledge how to use a hammer and chisel as being only of use to mere fitters. Another, while reveling in calculus, dislikes chemistry, and refuses to make "stinks." So we could go on, the chances being that the student, in his ignorance and inexperience, is apt to place among those things which he classes as no good, just the very thing that he will most require in after life. His position is deplorable. He says that he has not time to learn everything; yet, what is he to learn and what is he to leave? Each professor and master natually glorifies the one special subject which he teaches, and duly impresses on the unfortunate student that, whatever else he leaves alone, it is to the utmost importance that he leans that particular subject, so that no help is to be had from those whose place it is to give help in this matter.

Coming, now, to the chief difficulty that all students seem to experience, it is this—the want of combination of theory and practice. The relation between theory and practice should be most clearly shown; and yet, what is the case in practically every scientific institution that exists in this country? Why just the very opposite; a broad and yawning gulf, a veritable line of demarcation appears to be drawn, and the student feels this gap in his training, and seeks in vain for some bridge by which to cross.

In the class room he learns much of mathematics, of trigonometry and calculus. He has all sorts of weird curves and waves of EMF. and current drawn for him on the blackboard. He learns how to talk intelligently of power factors, of the paralleling of alternators, and so on. In the "shops" he learns how to turn a commutator, to wind an armature, and so on, and generally the work of a fitter or electrician, but, at the end of all this training, he still feels, that he is in no sense an electrical engineer—and why? because the work of the engineer is to apply theory to practice, and this he has never been taught.

All colleges at which electrical engineering is taught, have now extensive laboratories, and the student is taught the work of testing. He is taught, for example, how to find the efficiency of a direct current dynamo, the different sources of loss of energy in it, how to determine the characteristic curve, how to test transformers and arc lamps, and so on. So far so good; testing is most useful and necessary work, but the thinking student and the one who wants to get on, would like to go a step further. He does not rest content with testing somebody else's work; he wishes to build a dynamo or a transformer of his own.

Then comes the great difficulty; there is nobody to teach him how to do it. His professors being probably entirely theoretical men, cannot tell how to wind an armature, while, when he goes through the shops, the workmen, though they can tell how to do this, cannot tell why there are 48 conductors on it instead of 50.

The subject then of the design of electrical machinery, the work to which the student hopes to devote his life, is never taught, No practical bearing is taught him between the results which he obtained from tests of apparatus in the laboratory, and as to how he is to apply the knowledge gained from these results to the design and improvement of similar apparatus in the future.

The great connecting link between pure theory and the actual manual work of construction is missing, and the student, after finishing a lengthy course of theory and of "shops," would still be at quite a loss how to construct a small dynamo or motor to fulfill given conditions.

He has learned sufficient practice to be able to build the machine from drawings and data when supplied, and he has sufficient theoretical knowledge to test the efficiency and power when he has made it; but if he were given the conditions of running and a piece of paper, and asked to sit down and work out the design and details, he would absolutely be at a loss to know how even to begin. He would have no idea as to how many commutator bars he should have, as to what should be the ratio of length to diameter of armature, as to what magnetic leakage he must allow for, and so on. Surely all systems that neglect to teach these important points are gravely deficient.

Drawing a conclusion from these points, it seems to me, in my humble opinion as a student, that the training of students should, in all cases, be carried out under a principal who is himself a thoroughly practical engineer—a man who, while he excels in pure theory, should have himself been through the "shops;" and, most important of all, a man who thoroughly understands the design of electrical machinery in every detail, both theoretical and practical. The college itself should have, as far as possible, a workshop, however small, which is equipped to carry out the construction throughout of at least some small type of dynamo, motor or transformer. The students, while at the college, should, after they have been taught sufficient theory to understand the principles of design, be made to design and construct throughout small electrical apparatus of up-to-date patterns. Each individual student should be made himself to design a small dynamo or motor to fulfill given conditions as to speed, output, efficiency, etc., being supplied with all reasonable knowledge gained by past experience, such as would be available in any drawing office.

He should be shown how to hunt up and adapt this previous knowledge to the particular case in question.

At the same time, however, care should be taken not to check any originality on the part of any student. Let each student as far as possible design his own machine throughout from the commencement, and he will take great pride in trying to make a thoroughly neat, ingenious and efficient article. Never mind if there are inherent faults in the machine—these will soon be found out by the student in the construction and testing of the machine afterwards, and when a student finds out in this manner that he has made an error in design or draughtsmanship, it will impress itself on him in a more thorough and lasting manner than if merely pointed out to him on a piece of paper. Indeed, far more useful experience may be gained from constructing a faulty machine than a correct one, and the mistakes made will be most carefully avoided in the future.

It seems to me that this design and construction throughout by each individual student of at least one piece of electrical machinery is most important. Every calculation, every drawing, every detail of manufacture will be performed with additional interest and care, and the efficiency tests afterwards will be gone through with the greatest interest instead of in a haphazard and careless fashion.

Competition, too, will reign keenly among the students, and think of

the value of the possession of a set of drawings and calculations throughout.

It may be urged that the expense is too great; but surely the interest in work and the thoroughness of such a training would more than repay it, and the student once shown how to design, will in his own spare time be continually striving to design better apparatus and improve on details of construction.

I still have one or two points to touch on: One is this—the method of lecturing. All lecturers have their own special method, and the student has one minute to listen to one type of lecturer and the next to listen to quite a different type. The method of taking notes has to be suited to each individual lecturer, and consequently there are often very important notes lost. To explain: One lecturer will talk for half an hour, and then at the end sum up the pith of his lecture and give it out slowly, so that it may be copied into note books almost verbatim.

The next lecturer may start in the same manner, the students wait to the end to take notes, and then find that this new lecturer does not sum up his remarks, and consequently no notes are taken of the lecture at all, and much is forgotten. This appears a point which could be so easily remedied and with such beneficial results. The main points of every lecture should be given out slowly, either at the commencement or at the end of each lecture, so that they can be entered with reasonable care and neatness into rough notebooks. The system once chosen should, however, be strictly adhered to, as a sudden change without warning would mean the loss of a whole lecture's notes.

Another point is the symbols used in various subjects. It not infrequently happens that two professors are teaching the same subject, or at least parts of the same subject to the same class, and each professor uses his own particular symbols with the result— dire confusions and hours of time spent of an evening trying to disentangle θ's and φ's. A uniform system of symbols and abbreviations should be used by every lecturer in the college, and it is my belief that a small card with symbols and their explanations printed on it should be supplied to every student on entering a college. This would avoid all doubt and ambiguity once and for all. While on the subject of lectures, there is one class of lecturer, and a very common one too, who, in the name of my fellow students, I must strongly protest against. This is the man who is always in a hurry, who has so much on the subject that he cannot get it out fast enough. This sort of lecturer is worse than useless. It is mere waste of time for the students who, for an hour or two, are so confused that they literally don't know where they are, and leave the class room with a confused "jumble" in their heads that they are not fit to attend another lecture for hours.

Do let me remind you lecturers, one and all, that we students are not so clever as you. It seems to me that it is not altogether the cleverest man, and the man who can write a long string of letters after his name, is best fitted to teach; in fact, the reverse is often the caee. Undoubtedly, the big man, with a long tail to his name, is useful on the first page of a college prospectus; but, being so great and clever himself, he very often cannot understand the simple difficulties that form a stumbling block to the student. It is very often the man who is himself not so exceptionally gifted who is the best help to the student. He has himself experienced just the same difficulties as the average student; has had to climb laboriously over the same stumbling blocks, and is therefore in a better position to appreciate and understand the humble difficulties of the student.

The last point that I wish to touch on is one which has, perhaps, not hitherto been discussed, and it is the commercial training of the engineer.

A short time ago I heard a discussion in a private committee room of the House of Commons on the suitability of a site for some gas works. The principal witnesses on either side were expert engineers, and the amount and variety of knowledge entirely apart from their profession which they had to show was enormous. The value of building land, of dwelling houses, the laws of compensation for property taken or damaged, and such like things too numerous to mention, they were expected to have at their fingers' ends.

To expect a student to learn all this in his course of study is too much, but I believe that a short and practical insight into the very necessary commercial branch of his profession should be most certainly given him.

He should at least know the essential principles which constitute efficiency and economy in manufacture and works management, a little about some system of standardization in manufacture so as to enable a large number of machines of the same class to be manufactured cheaply and quickly, a little about the law governing the relations between the employer and his workmen, and also a few gleanings from the patent laws so as to be able to protect himself in any eventuality.

Summing up all the points I have touched on in this little article, I will simply say that, taking everything into consideration, it is my belief, and the belief of every thinking student that I have come across, that the present system of training of engineers fails; firstly, because of the lack of continuity in training as regards theory and practice; and, secondly, that the heads and staff of many of our institutions are not practical enough. It is thought that if a student is turned out with his head full of dx, dy, and with excellent certificates, that they have done their duty, but the unfortunate student though thus provided with excellent tools has never been taught how to use them to his best advantage.

There are many things that go to make the qualifications of a successful engineer, but the chief one is that he should be able to turn what knowledge he has, however little it may be, to the best practical account; that what theory he does know, the more the better, of course, should be at his fingers' ends and ready for immediate use; in other words, that he should be practical, in the real meaning of the word, to his finger tips.

I must now conclude, as I am afraid that it is too much for a student to presume to take up any more of valuable space in a professional paper. Perhaps, indeed, this little article may never be allowed to see the light of day; but I hope Mr. Editor will remember that he was a student himself once, and will not be too hard.

My readers must bear in mind that these are but the views of a student, but, at the same time, they are the outcome of his training, and, if wrong, point to a flaw somewhere in it.

It is quite possible that many students—possibly all professors—will disagree with what I have said. I shall not mind this; better to have wrong views than no views at all; and my object is simply, if possible, to promote some discussion on the subject and set those in authority thinking.

If, at the same time, I have been allowed through the courtesy of the editor, to have shown up any real difficulties that my fellow students experience in fitting themselves for their profession, I shall feel more than repaid for the trouble I have taken and the possible adverse criticism that my views may be subjected to.

Insulators for Long Distance Power Transmission Lines.[1]

The following matter relating to insulators for electric power transmission lines is taken from an interesting paper on the problems and difficulties of the transmission of power long distances, read by Dr. F. A. C. Perrine before the Massachusetts Institute of Technology and printed in the *Technology Quarterly* for June.

For potentials up to about 25,000 volts, where an insulator of 7-inch diameter is sufficient, there seems not much reason for the employment of anything except glass, unless the lines reach a size above ½ inch in diameter, when its strength is deficient. For these lower potentials and lighter lines the good properties of glass are easily summarized. In the first place, it is cheaper by far; while not so strong as porcelain, it is, as has already been said, sufficiently strong for the purpose; its inspection is easier and surer, since it requires only a visual examination and a few taps of a hammer to ascertain its soundness in place of the tedious high potential test necessary in the examination of porcelain. But having said this much, all has been said that is possible in favor of glass.

It is not true that glass is a better insulator than sound porcelain, nor is its surface so good in damp weather against surface leakage. The mechanical strength does not equal one-half that of porcelain, as has been proved by a long series of mechanical tests performed by dropping a steel ball from a height upon insulators of the two materials; temperature also affects it much more than porcelain and it is often found to crack simply from the effect of extreme changes of temperature.

The insulators for high voltage lines must be very large, for the reason that with a striking distance through the air of from 4 to 6 inches, great gaps must be provided in the path of the current. But above all a great creeping distance is essential. Insulators that are a perfect protection in the hardest rains fail utterly in clear weather when covered by smoke and soot, which allow small amounts of currents to escape and char away the pins or cross arms. The compound insulator is very attractive, for the reason that it is easier and cheaper to make and handle two or three small parts rather than one large one, and in some cases the additional advantage has been sought of securing the good properties of both glass and porcelain by making parts of an insulator of each; but there is both a theoretical and practical fallacy in this type of design. In the first place, no dielectric is so strong as one

1. *Engineering Record.*

entirely homogeneous. As the stress is passed from glass to porcelain, or *vice versa*, at the two surfaces the stress piles up as it were, and it is better if one believes in glass to rely upon it; or, on the other hand, to show faith in the porcelain used by employing it entirely.

From the pure standpoint of practice the insulator which must be cemented together is troublesome. The shrinking of the mastic leaves voids and produces strains; if cement be used, its slowness in hardening delays the work and requires large areas for setting out to harden any considerable number of insulators. The one other mastic in use is molten sulphur, which, while better as a mastic than cement, is still more liable to crack the insulators while they are being joined, and finally when exposed to light and air, frequently decomposes on the surface, producing sulphuric acid; and, finally, when current creeps over its surface following the acid, perhaps, catches fire and often results in the rupture and fall of the insulator. The insulator which will be entirely satisfactory for this use has not yet been found, but the diligent search made for it by some of our best engineers is resulting in its definition and will probably soon result in its production, not as an inspiration for a patent, but as a careful engineering conception.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

Mr. Forstall Replies to Mr. Egner.

NEW YORK, Oct. 28, 1902.

To the Editors AMERICAN GAS LIGHT JOURNAL: In the issue of the JOURNAL dated October 27th, I notice a letter from Mr. Frederic Egner, in which he states that he understood me to tell him, on October 6th, in talking about the, at that time, approaching meeting of the American Gas Light Association, that I regretted not to have called for a paper on inclined retorts, and did not see how I had overlooked it. I am usually careful to express myself clearly, and am at a loss to comprehend how Mr. Egner could possibly have placed such a meaning upon anything that I said to him during our interview on that day. I was congratulating myself at the time on having practically secured Mr. Brown's promise to present to the Association his reasons for not installing inclined retorts at Milwaukee, and had no reason for concealing the matter; and my recollection is that I told Mr. Egner exactly the opposite of what he understood me to say. In fact I have a distinct recollection of saying in effect that I thought the paper would lead to a lively discussion, as Mr. Brown usually had good reasons for his opinions, and was very apt to stick to those opinions in spite of adverse criticism.

No one regrets more than Mr. Brown and myself that the paper was not in shape in time to be published and sent out with the other papers when they were distributed to the members; but it is not an uncommon occurrence for papers to be brought in in this way, this having happened to at least one paper at each of the meetings of the Association since, and including that for 1899. There is, therefore, no warrant for speaking of this paper as having been introduced in an unfair manner. However, as I stated at the meeting, if there was any unfairness about it the blame rests entirely upon me. Yours truly,

ALFRED E. FORSTALL.

The Present Condition of the Manufacture of Aluminum.

According to Prof. Joseph W. Richards, Chairman of the Committee on Metallurgy of the American Aluminum Association, the year past has seen very considerable activity in the production of this metal. This activity has not been so noticeable abroad. In Europe the industry has not progressed to anything like the degree which it has in America. As in iron and steel and copper, America has surpassed the rest of the world in the production and utilization of aluminum. This activity in America is due almost entirely to the enterprise of the operators of the Hall process. The extensions which this company have already completed or which they have in contemplation are startling.

The bauxite deposits of Georgia have been falling off in productiveness while those of Arkansas have been increasing. An exceptionally pure quality of bauxite has been found in Arkansas, but the quantity available is somewhat uncertain. If the quantity of this pure variety should turn out to be as large as is claimed by some it will furnish a decidedly superior material for this industry, better than any it has heretofore had at its command.

The purification of the bauxite has been improved. The old Bayer process has received several important improvements in its various details which have improved the quality of the alumina produced and reduced to some degree the cost of purification if not the selling price of the alumina. The Pittsburgh Reduction Company, owning themselves large tracts of bauxite lands in Arkansas, have erected this year and just put into operation a large and costly plant in East St. Louis for purifying bauxite, using the patented "lime process" devised by Mr. Hall. This process produces a quality of alumina of exceptional purity at a slightly lower cost than that of ordinary alumina by the Bayer process, and enables the users to thereby enhance the purity of the metal which they commercially produce. The same company are also preparing to operate a new electrical method of purifying bauxite, which will be operated at their Niagara works and which may still further reduce the cost of making pure alumina.

The reduction of the alumina to metal is now progressing in America on what would have been regarded 10 years ago as a stupendous scale. With 11,000-horse power operating at Niagara Falls and 5,000-horse power at Shawinigan Falls, in Quebec, America possesses 16,000-horse power devoted to producing this metal. This will produce aluminum at the rate of 4,500 tons yearly, or a production twice as large as that of the rest of the world put together. Not only is this rate of production actually in force, but the same company have in contemplation the utilization of 12,000-horse power additional at Massena, N. Y.

This association cannot but view with gratification the success and the enterprise of this youngest of our nation's metallurgical industries. The very large scale of production, the large amount of capital invested, and the enterprise and good business sense of those producing the metal, all unite to assure to the industry a more constant and more satisfactory supply of the metal than ever before, at prices leaving a fair margin to the subsequent user and of a quality continually improving without corresponding increase in price.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE State Department of Pennsylvania has issued a charter to Messrs. John Donegan, Michael O'Reilly, Jas. M. Degnan, Henry W. Brewer and Chas. H. Gorman, who are the incorporators of the Consumers Heat, Light and Power Company, the purpose of which is to furnish a general lighting supply from a central station in South Bethlehem, Pa. The maximum charge to be made on gas sales' account is $1 per 1,000 cubic feet.

MR. JAMES B. BURDELL has resigned the position of local Manager at Petaluma, for the Central California Gas and Electric Company. His successor is Mr. Herman Weber, formerly in charge of the Chico (Cal.) Gas and Electric Company.

MR. J. L. HOKE succeeds Mr. Weber at Chico.

MR. JOSEPH R. GILKYSON has been appointed to the vacancy in the executive management of the South Jersey Gas, Electric and Traction Company, caused by the resignation of Mr. Richard Stockton, which resignation was reported some time ago in the JOURNAL.

A CORRESPONDENT forwards the following from Jamaica, L. I., under date of the 25th ult.: "Irvy Myers, of North Paterson, N. J., to whom the Village Trustees of Patchogue, L. I., recently granted a franchise for the laying of gas mains in the village limits, has filed his written acceptance of the terms demanded by the village fathers, and has organized a Company to be known as the Patchogue Gas Company. The capital stock of the concern is placed at $150,000, and the articles of incorporation were filed with the Secretary of State at Albany this week. The incorporators in the certificate are Irvy Myers and S. Barnes, of North Paterson, N. J.; Jacob Sanford, of New York, and two others. The Company proposes to begin work as soon as possible, and promises to have gas ready to sell to the inhabitants within less than a year. Village Clerk Losee says that the protest entered by John L. Gerety against the granting of the franchise to Myers has no effect, and that the village trustees acted within their legal authority in disposing of Gerety's application without a public hearing, or granting him a hearing. T. G. Carlin and other well known Brooklyn and Patchogue people are said to have been interested with Mr. Gerety in his recent application."

AT the coming general election the voters of Fairfield City (Ia.) will vote upon the terms of a new franchise which the authorities recommend on behalf of the promoters of the Fairfield Gas and Electric Company. A franchise somewhat similar was submitted last spring, but was defeated by an overwhelming majority. The proposed franchise covers a period of 15 years and makes a flat rate for gas of $1.60 per

1,000 cubic feet for the first 5 years, $1.55 for the next 5, and $1.50 for the last 5. In the former proposition there was no reference to electric light charges. Now the Company proposes to reduce the price from 20 cents per 1,000 watt-hours to 16 cents for the first 5 years, 15 cents for the second 5, and 14 cents for the last 5. The new proposition is quite an improvement over the old one.

THE Saugerties Light, Heat and Power Company, to manufacture and distribute gas and electric currents for lighting, heating and power purposes in Saugerties, N. Y., has been incorporated by Messrs. H. B. Hord and R C. McCormick, of New York, and C. W. Eichells, Jr., of Ridgewood, N. J. It is capitalized in $50,000.

A CORRESPONDENT in Brooklyn, N. Y., forwards the following under date of October 28th: "Major Walter K. Rossiter, who has acted as Assistant Secretary to the Brooklyn Union Gas Company since its formation, has been elected Secretary of the Company to succeed Mr. Edwin Ludlam. Major Rossiter was Secretary of the Fulton-Municipal Gas Company when that Company joined in the merger that resulted in the formation of the Brooklyn Union Company, and was a prominent candidate for the Secretaryship of the Company when its executive force was being organized. He has virtually been the Secretary of the Company for some time back, owing to the illness of Mr. Ludlam. Major Rossiter is well and favorably known to the gas men of the United States."

WORK on the plant of the Ord (Neb.) Gas and Electric Lighting and Heating Company is well underway. The projectors of the enterprise declare that the system will be in readiness for operation by January 1st, but a correspondent in Lincoln informs us that the prediction is optimistic by weeks or even months.

ACCORDING to advices by way of St. Louis, dated October 25th, the proprietors of the Alton (Ills.) Railway, Gas and Electric Company have planned to put in 14 miles of additional gas mains during the next few months, and to extend the present mains to Upper Alton and North Alton, two flourishing districts within comparatively easy reach, as soon as the necessary franchises can be secured. Continuing, our correspondent says: "The plan of extending the mains, as well as the ordering of many important improvements to the manufacturing divisions of the gas and electric lighting systems, was announced after a meeting of the Directors, held a few days ago, by President J. F. Porter. President Porter's scheme of betterment received the unqualified support of Mr. A. H. Fletcher, of your city, who is one of the largest holders of stock in the Alton Company."

MR. CARROLL MILLER has taken unto himself a bride, in the charming person of Mary Emma Guffey, daughter of Mrs. John Guffey, of Pittsburg, Pa. The ceremony which made Mr. Miller a Benedict took place in Pittsburg last Tuesday.

AT a special meeting of the shareholders in the East Boston (Mass.) Gas Company, held last Thursday, it was resolved to increase the capital in the sum of $55,000, the proceeds to go to payments on account of construction and extension.

MR. W. S. ELDRED has been appointed Manager of the plants of the Bishop (Cal.) Light and Power Company, vice Mr. A. T. Dickey, resigned.

MR. FRANCIS S. THAYER, who took charge of the plants of the Westerly (R. I.) Gas and Electric Light Company last December, reports that the main extensions completed this season have resulted in the securing of a larger number of new consumers than had been counted upon. The gains made have caused the proprietors of the Company to plan for the placing of 3 miles of additional pipe next spring.

THE annual meeting of the shareholders of the Brooklyn Union Gas Company, of Brooklyn, N. Y., will be held at 2 P.M. of the 11th inst.

A CONTEMPORARY notes that a stray electric current fell foul of a gas pipe on a viaduct in Worcester, Mass., and produced results immediately but erroneously attributed to electrolysis. The viaduct rests on abutments on either side of a street and on a row of riveted columns. A 2-inch gas pipe touched a column and formed the only good ground connection of the whole structure. Two trolley lines pass under the bridge and the hangers for one of the wires became loose and allowed it to touch the metal work. When this occurred it was naturally troublesome to keep the circuit breaker in place in the power house, for a large part of the current was passing into the earth through the pipe. An investigation was started which showed that about 3 feet of the gas pipe was practically burned out, and that the cement in one of the joints was fused into glass.

MR. JOHN WERRY, Manager of the Nevada County (Cal.) Gas and Electric Company, declares that the people of Nevada city are not slow to appreciate the advantages of gas for cooking. In fact he says that in a short time the "city" will not have many houses without gas in the kitchens thereof.

MR. D. C. PRENTICE now controls through purchase the plants of the Le Roy (N. Y.) Gas and Electric Company. This gives him a monopoly of the supply of gas and electric currents from a central station in the named district.

AT a recent meeting of the Board of Public Works, of Poughkeepsie, N. Y., an opinion from the City Attorney was read stating that the Board had no power to refuse permission to the Poughkeepsie Light, Heat and Power Company to open the streets for main extensions, when such applications were made in due form. The Board, however, had the right to determine whether or not such openings were made, carried on and completed in accordance with the franchise grant under which the Company operates.

THE Trenton (N. J.) *Times* is our authority for the statement that the Trenton plant of the South Jersey Gas, Electric and Traction Company is sending, through the recently constructed high pressure line, a goodly quantity of gas daily to help out the demands of the Company's consumers in its Camden district.

THE piping system that is to connect the outlying district of Algiers with the main system of the New Orleans Lighting Company is well along toward completion. The river crossing or connection was an especially difficult task.

MR. JEREMIAH BEASTON, a long-time employee in the service of Messrs. R. D. Wood & Company, was recently presented with a handsome testimonial from the proprietors of the Auckland (New Zealand) Gas Company. The reason for the gift was their satisfaction with his services in connection with the construction of a gasholder, the contract for which had been given to and satisfactorily carried out by Messrs. R. D. Wood & Company.

THE proprietors of the Bridgeport (Conn.) Gas Light Company have been obliged to put into commission the generating plant of the Citizens Gas Company, in order to meet the extraordinarily heavy demands that are being made by the residents for a gas supply. When the betterments now underway on the old plant are completed the Citizens works will again be shut down.

ACCORDING to the statement submitted by the United Gas Improvement Company to the authorities of Philadelphia, the gas sold by the Company, during the quarter ended September 30th, amounted to 1,133,592,760 cubic feet.

MR. H. C. RODGERS, of Pasadena, Cal., has complied with all the formalities required by the authorities of San Pedro, Cal., for the construction and operation of a gas and electric lighting plant at the last named place.

IN an opinion recently given by Attorney-General Hicks, of Wisconsin, he declared that in his judgment oil brought into the State for heating purposes does not come under the law providing for State inspection of oil. Some time ago the Standard Oil Company shipped a carload of fuel oil to a firm in La Crosse, and the State Inspector of Oil, T. F. Mills, believed that such oil should be inspected as was illuminating oil, and that like fees should be obtained therefrom. As it had never been the practice in Wisconsin to follow such a course, the matter was referred to the Attorney-General with the result above noted.

THE Adams (Mass.) Gas Light Company has arranged for the removal of its offices and showrooms to suitably located quarters on Park street.

THE proprietors of the Steelton (Pa.) Home Gas Company report difficulty in keeping up with the applications made to them for services.

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Notification Respecting Advertising.—Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

MONDAY, NOVEMBER 3, 1902.

The Market for Gas Securities.

The net changes in the values of local gas shares for the week are unimportant so far as such values may be determined by current quotations. There was some activity in Consolidated, the dealings in which are largely attributable to a certain scalper who buys a couple of hundred shares in the morning and sells a like number in the afternoon, or *vice versa*. Some day he'll get his day sections mixed. The settlement of the coal strike, even so far as the preliminaries to arbitration are concerned, is not as rosy as the original proclamations led one to believe, but in any event the Consolidated Company, of this city, through the early efforts of its executives, will have material of one sort or another to keep its customers supplied come what may in the instance of the later "acts" of the operators and the "miners."

Brooklyn Union is unmistakably strong, although many points separate the ideas of would-be buyers and intending purchasers The named quotations are: Bid, 227; asked, 246. It is worth more than the asking price. The advent of Mr. A. S. Miller to the managership of the Consolidated Gas Company, of Baltimore, will be watched with curiosity. He has there a hard "row to hoe," unless people with whom he was in touch when in New York have succeeded to the estates of several of the Southern contingent.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

NOVEMBER 3.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	218¼	219
Central Union, Bonds, 5's.	3,000,000	1,000	110	112
Equitable Bonds, 5's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	350	..
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co..				
Bonds, 5's	11,000,000	1,000	113½	113
Northern Union, Bonds, 5's.	1,250,000	1,000	108	110
New York and East River..				
Bonds 1st 5's	3,500,000	1,000	112	113
" 1st Con. 5's	1,500,000	..	109	111
Standard	5,000,000	100	130	140
Preferred	5,000,000	100	150	160
Bonds, 1st Mortgage, 5's	1,500,000	1,000	115½	118
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	227	246
" " Bonds (5's)	15,000,000	1,000	119	119½
Bay State	50,000,000	50	1¼	1⅝
" Income Bonds	2,000,000	1,000	.	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	10¾	11
" " Bonds, 5's	5,256,000	1,000	79	81
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	.	.
Central San Francisco	000,000	..	105	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co.	29,500,000	100	100¾	100¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	101	101½
Columbus (O.) Gas Lt. & Heating Co	1,682,780	100	88¾	89¼
Preferred	3,026,500	100	107⅞	109
Consumers, Jersey City Bonds	600,000	1,000	102	103
Consumers, Toronto	1,700,000	50	218	225
Consolidated, Baltimore	11,000,000	100	73¼	73¼
Mortgage, 6's	3,600,000	..	..	116
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	.	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	380,000	1,000	85	87
Consolidated G. & E. Co.'s. Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	.	89
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	852,000	1,000	77	79
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	34	38
Fort Wayne	2,000,000	..	.	.
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	70	80
" Bonds, 6's	2,550,000	..	103¾	104⅞
Jackson Gas Co	250,000	50	73	75
" 1st Mtg. 5's	290,000	1,000	101	102¼
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	84
Preferred	2,500,000	100		110
Bonds	10,000,000	1,000	109½	110
Lafayette Gas Co., Ind.	1,000,000	100		60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	112	120
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	107½	109½
" 6 per cent. scrip, due 1910	100,000	25	25	87
Montreal, Canada	2,000,000	100	218	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	56	58
Bonds, 6's	4,000,000	..	105	106¾
New Haven	1,000,000	25	300	325
Nashville Gas Lt. Co.	1,000,000	100	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	757,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	103¼	103¾
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co.	2,150,000	50	88	.
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	48	45½
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's	2,465,000	1,000	92	93
St. Joseph Gas Co.				
" 1st Mtg. 5's	751,000	1,000	95	96½
Syracuse, N. Y.	1,975,000	100	29	..
Bonds	2,047 000	1,000	99½	100
Washington, D. C	2,000,000	20	375	380
First mortgage 6's	600,000	..	..	..
Western, Milwaukee. Bonds, 5's	4,000,000	..	109½	110
Wilmington, Del.	600,000	50	232	..

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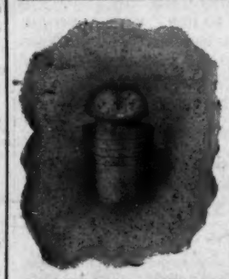

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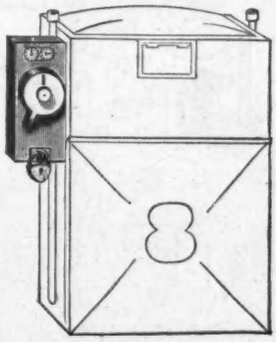

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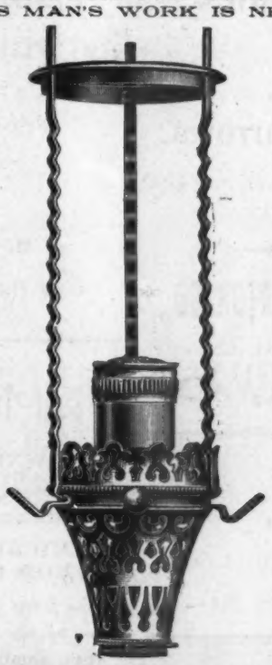

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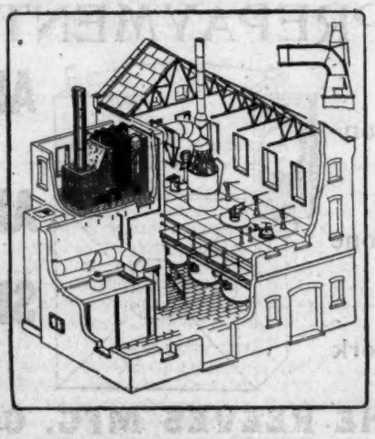

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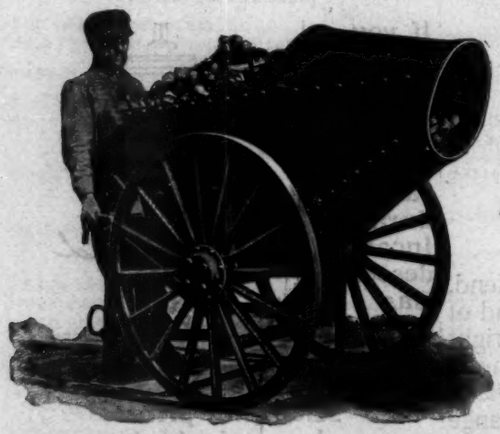

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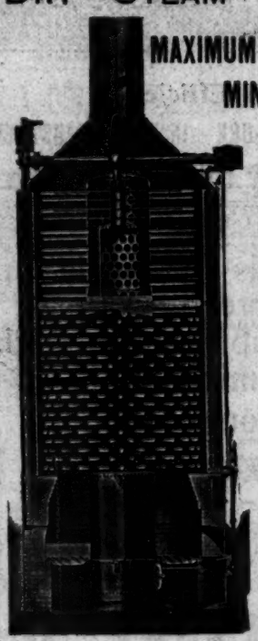

The Hazelton Steam Take Off is heated by the Gases of combustion. It carries enough heat to reconvert any moisture that may be in the steam into steam once more. It is better than a separator—needs no attention, and assures the use of every pound of steam paid for.

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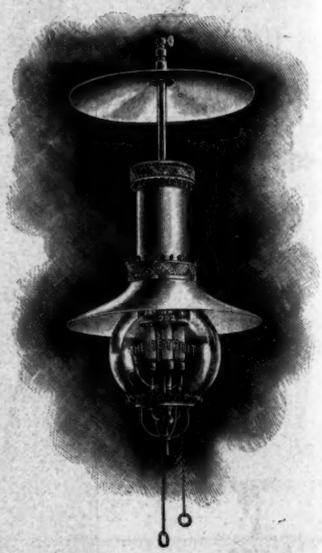
RUTHERFORD, N. J., U. S. A.
Tele., 6M Rutherford.
Cable Address, "Paila," Rutherford.

The DETROIT



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ARC GAS LAMP.

Durability,
Efficiency,
Simplicity,
Economy.

Perfect Combustion.
No Chimneys to Break.
No Matches Necessary.
Consumes Less Gas.
A Handsome Fixture.
Always in Order.

Our lamp gives 25 per cent. *more light* with 20 per cent. *less gas* than any Arc Gas Lamp now on the market.

TO LIGHT CONSUMPTION WHAT THE GAS RANGE IS TO FUEL.

SAMPLE ORDERS *Solicited.*

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Of Uniform Excellence and Greatest Candle Power.

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Cheapest and Best.

THOUSANDS IN USE WITH INCANDESCENT BURNERS.

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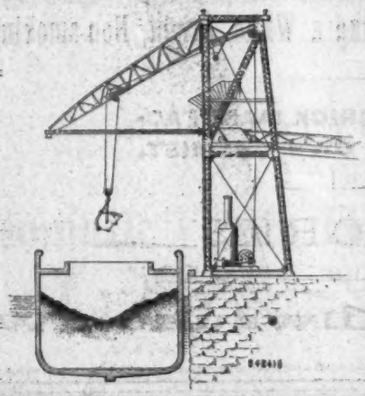

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COAL HANDLING MACHINERY.

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The Best Light in the World

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Stores, Churches, Halls or any large indoor areas.

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A Complete Revolution in Gas Lighting.

A sample lamp sent on 30 days' trial to any Gas Company.

This lamp is thoroughly protected with both Mechanical and Design Patents. Imitation of this Design and Construction will be prosecuted.

Manufactured by the

General Gas Light Co.,

KALAMAZOO, MICH.

Mueller Sweated Joint Meter Connections.

B-694-K.

ONCE in awhile the tortoise does get ahead of the hare. The deliberate gas man sees that **Mueller Machine Formed Meter Connections** cost him about half as much as those made by hand. The hasty fellow has overlooked this great modern invention.

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DECATUR, ILLS., U. S. A.

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TROY, N. Y., U. S. A.

Double and Single Gate Valves, ¼" to 72",

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HOT GAS VALVES A SPECIALTY.

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Coal and Water Gas Plants.

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A new design in which the gas passes under perforated plates and is washed in the suspended water and spray. Built in sections, each section complete. The entire interior accessible for cleaning from the outside.

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Drawings, Specifications and Estimates furnished for the construction of new works or alteration of old works. Special attention given to Patent Office drawings.
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SYSTEM OF

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ZIMMER SWINGING CONVEYORS,

FOR HANDLING COAL OR COKE.

Jones Jet Photometer.

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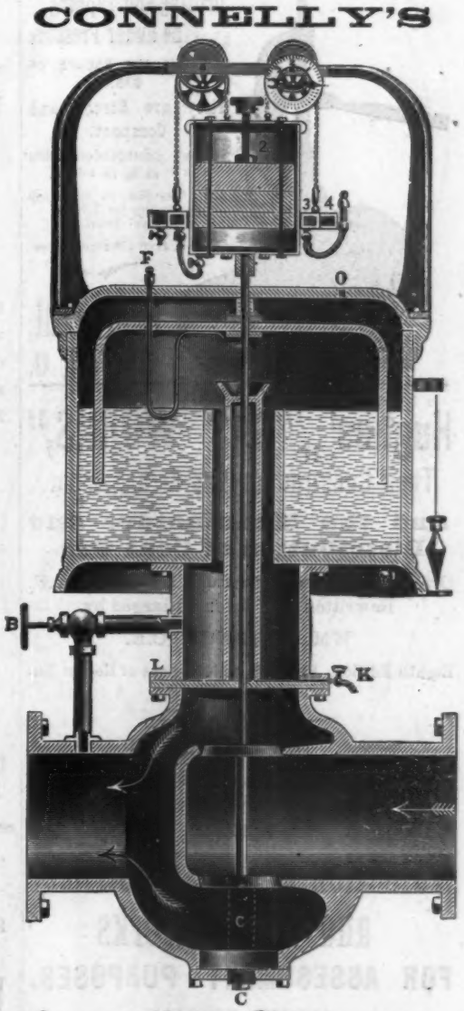

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MODEL OF 1900.

CONSTRUCTORS OF COAL GAS APPARATUS.

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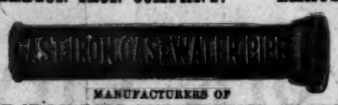
DONALDSON IRON COMPANY. EMAUS, PA.



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GAS TAPPING MACHINES

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WITHOUT ANY ESCAPE OF GAS.

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Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

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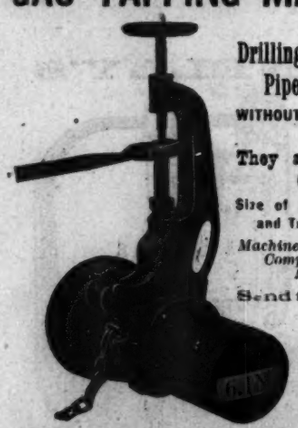

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Any size gas main can be shut off in 30 seconds. : : :

Temporarily during alterations and repairs. : : : :

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Humphrey Crescent Instantaneous Water Heaters,

A LUXURY and NECESSITY.

This is Our No. 2 Heater.

Supplies hot water for domestic use as well as for the bath.

It Has No Equal

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including nickel plated shelf and brackets.

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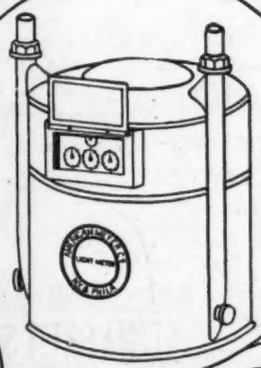
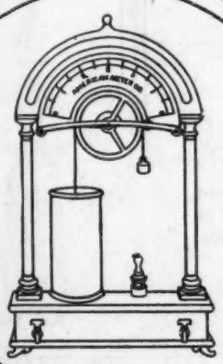
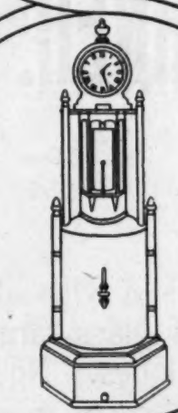
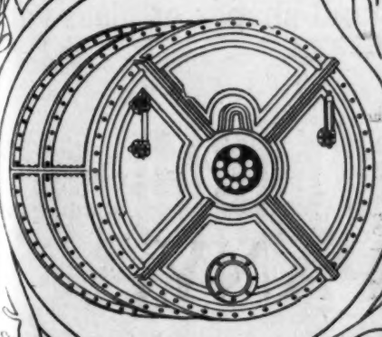








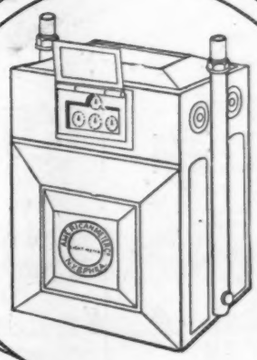
PUBLIC LIGHTING TABLE.

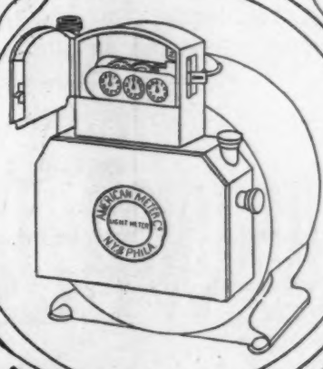
NOVEMBER, 1902.

Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING. Light.	Extinguish.
				P.M.	A.M.
Sat.	1	5.30 PM	5.30 AM	4.45	5.35
Sun.	2	5.30	5.30	4.45	5.35
Mon.	3	5.30	5.30	4.45	5.35
Tue.	4	7.20	5.30	4.45	5.35
Wed.	5	8.10	5.30	4.40	5.45
Thu.	6	9.00	5.30	4.40	5.45
Fri.	7	10.00	5.30	4.40	5.45
Sat.	8	11.00 FQ	5.30	4.40	5.45
Sun.	9	12.00	5.40	4.40	5.45
Mon.	10	1.00 AM	5.40	4.40	5.45
Tue.	11	2.00	5.40	4.40	5.45
Wed.	12	3.10	5.40	4.30	6.00
Thu.	13	4.20	5.40	4.30	6.00
Fri.	14	No L.	No L.	4.30	6.00
Sat.	15	No L. FM	No L.	4.30	6.00
Sun.	16	No L.	No L.	4.30	6.00
Mon.	17	5.10 PM	7.50 PM	4.30	6.00
Tue.	18	5.10	9.00	4.30	6.00
Wed.	19	5.10	10.10	4.25	6.00
Thu.	20	5.10	11.10	4.25	6.00
Fri.	21	5.10 LQ	12.20 AM	4.25	6.00
Sat.	22	5.10	1.30	4.25	6.00
Sun.	23	5.10	2.30	4.25	6.00
Mon.	24	5.10	3.30	4.25	6.00
Tue.	25	5.10	4.30	4.25	6.00
Wed.	26	5.10	6.00	4.20	6.10
Thu.	27	5.10	6.00	4.20	6.10
Fri.	28	5.10	6.00	4.20	6.10
Sat.	9	5.10 NM	6.00	4.20	6.10
Sun.	30	5.00	6.00	4.20	6.10

TOTAL HOURS LIGHTING DURING 1902.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	238.30	January	423.20
February	196.20	February	355 25
March	196.20	March	355.35
April	166.40	April	298.50
May	151.40	May	264.50
June	131.10	June	234.25
July	142.40	July	243.45
August	162.00	August	280 25
September	179.00	September	321.15
October	216.30	October	374.30
November	224.10	November	401.40
December	250.00	December	433.45
Total, yr.	2255.00	Total, yr.	3987.45

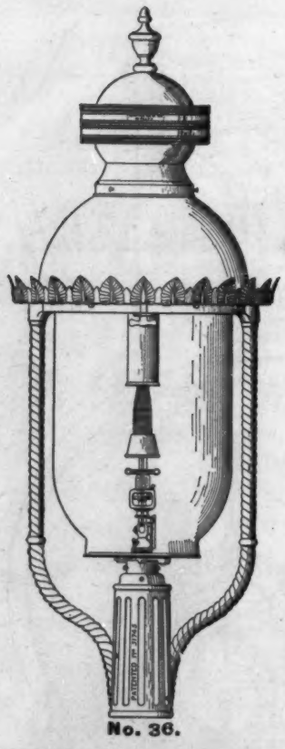




NEW YORK, 33 Nassau Street. PHILADELPHIA, Broad and Arch Streets. CHICAGO, Foot of Orleans Street. BOSTON, 624 Tremont Building.
CLEVELAND, 809 Cuyahoga Building. ST. LOUIS, 712 Roe Building. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



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Controls and Operates the

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Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others Interested in Municipal and Outside Lighting.

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The most practical, efficient and artistic burner yet produced. . . . . .

It contains an improved adjustable Bunsen so constructed as to permit of a wide range of variations in gas pressure without blackening the mantles and without an adjustable air shutter. . .

It can be used with all styles and sizes of glassware, either shades or globes. No further necessity to carry a stock of different burners for the many sizes and shapes of glassware.

GAS COMPANIES AND DEALERS CANNOT FAIL TO APPRECIATE THE MANY SALABLE FEATURES OF THIS NEW BURNER.

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Salesrooms in all the Leading Cities of the United States.

THE STANDARD DOUBLE SUPERHEATER

LOWE WATER GAS APPARATUS.

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Works, Weber, N. J.
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Standard Fire Brick and Gas Retorts.

Designers and Builders of Chimneys of Perforated ....Radial Blocks....

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Fire Clay Goods for Gas Works.

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BENCH SETTINGS,
Fire Brick, Tiles, Etc.

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In Kegs, 100 to 200 " " 6 " "
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Containing 6, 8 or 9 Retorts.

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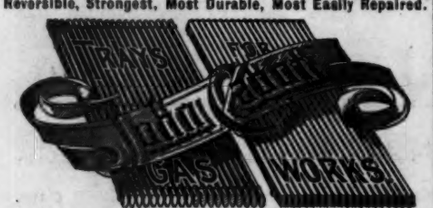

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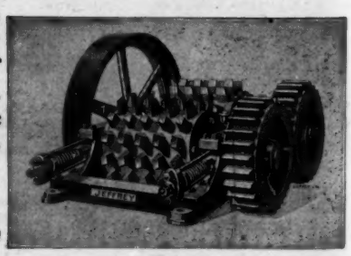

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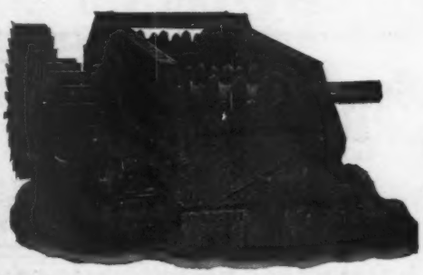

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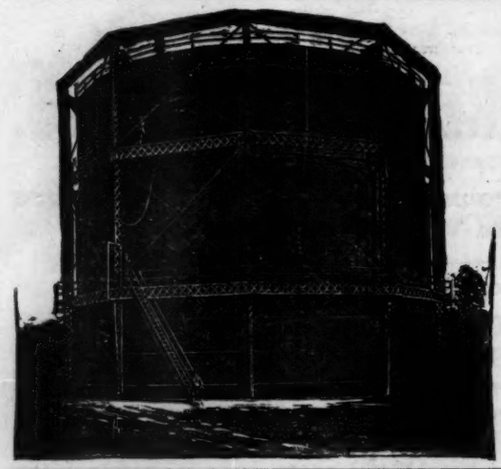

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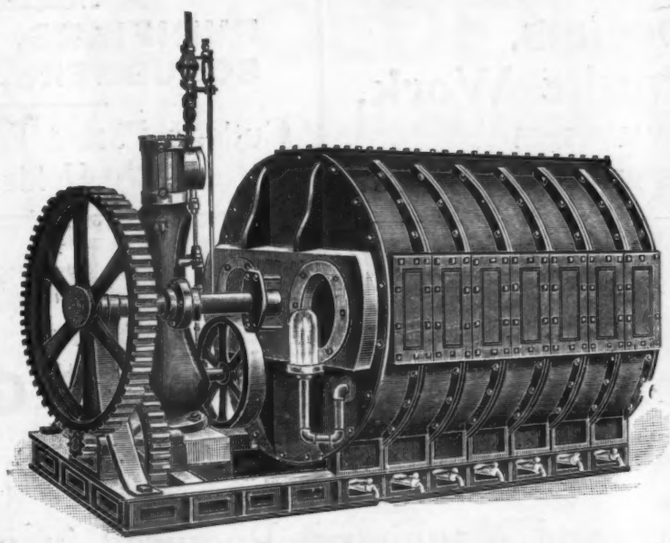

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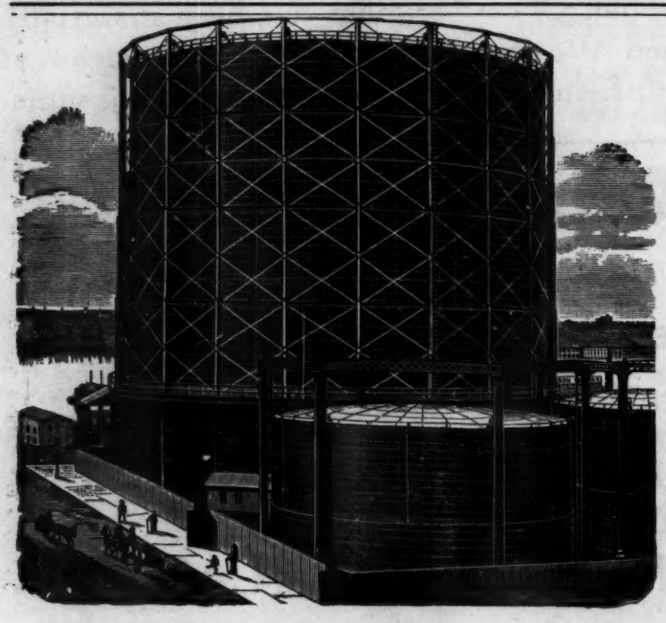

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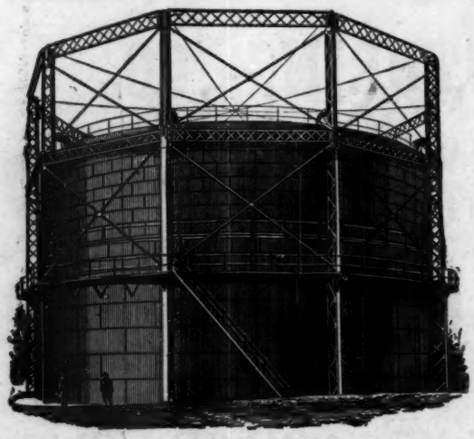

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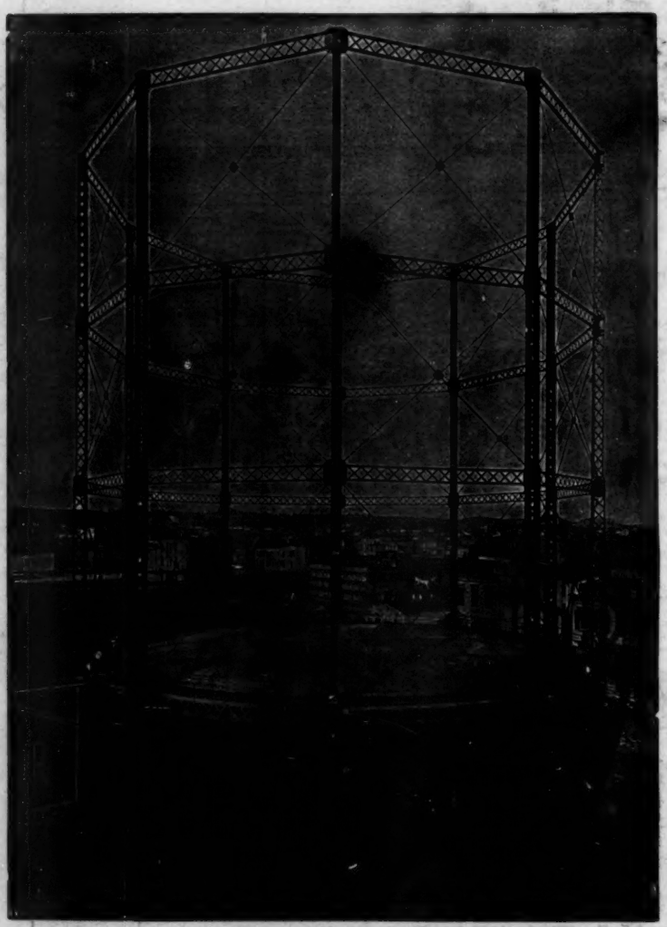

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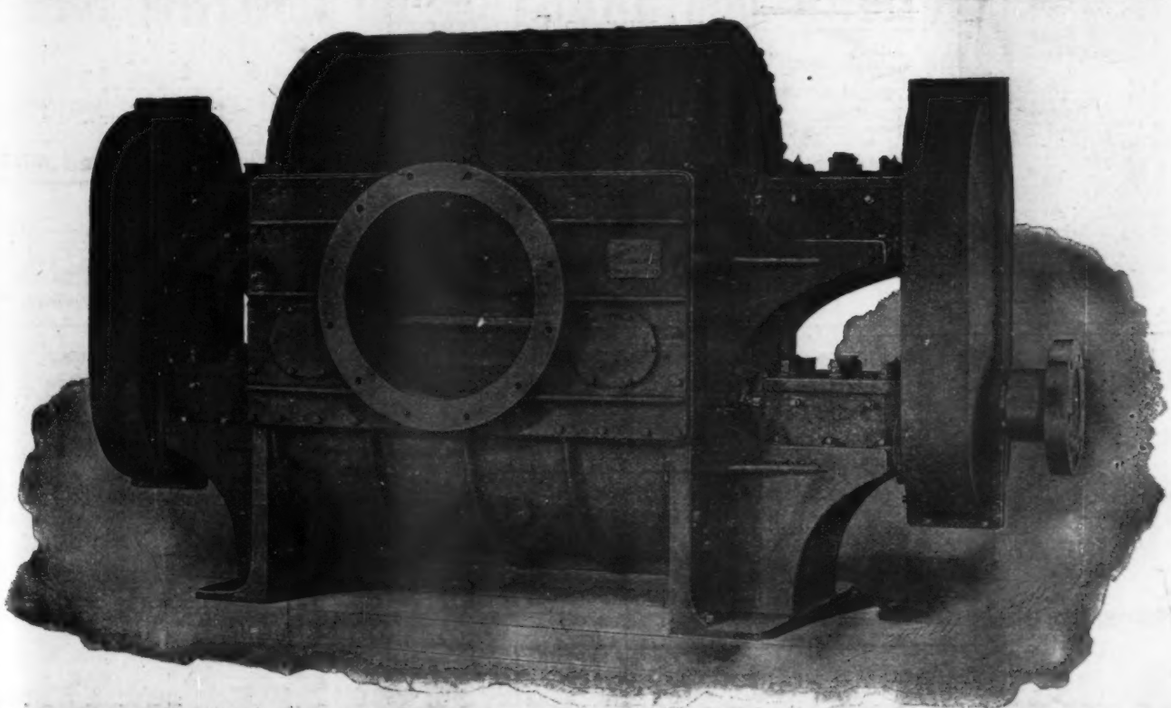

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